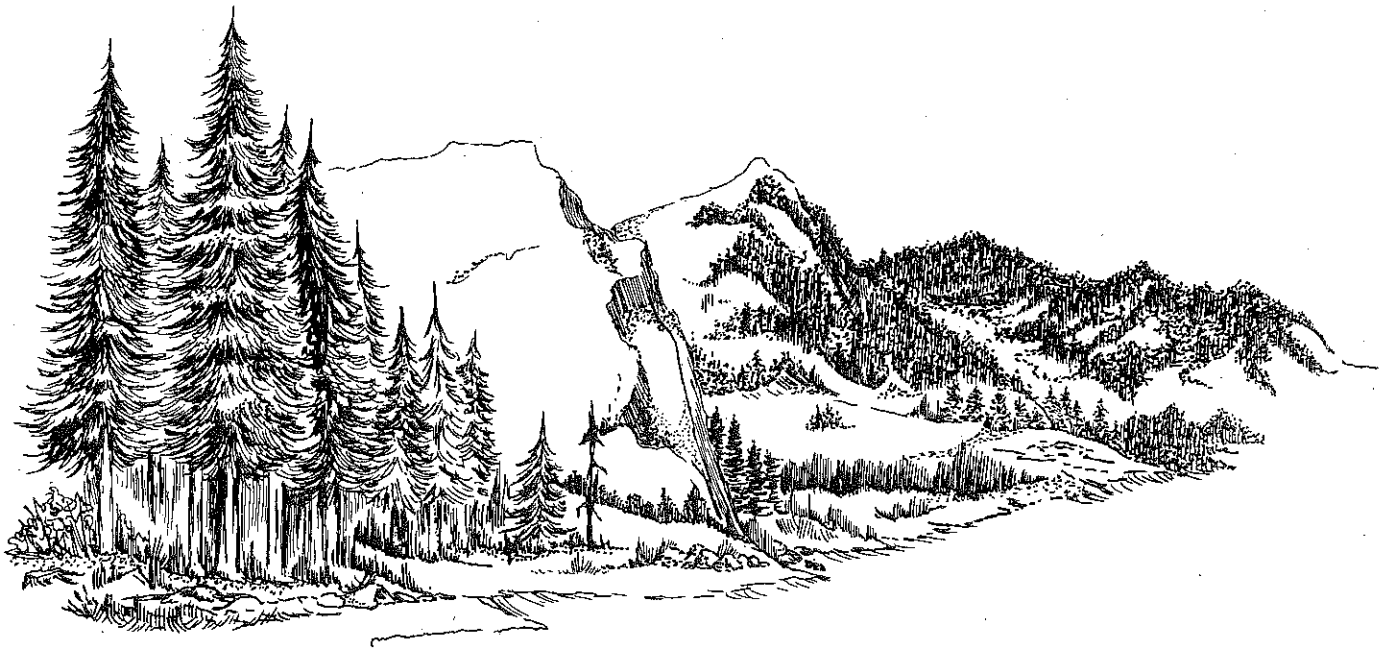

WESTERN MONTANA

planning area ANALYSIS

USDA FOREST SERVICE
NORTHERN REGION

AREA ANALYSIS OF NATIONAL FORESTS IN WESTERN MONTANA

Flathead, Kootenai, Lolo, and Portions of the
Bitterroot, Deerlodge, Helena, and Kaniksu National Forests

U.S. Department of Agriculture
Forest Service, Northern Region
Missoula, Montana
Review Draft, March, 1978

FOREWARD

THE ROLE OF THE AREA ANALYSIS

Land management planning is an integral part of managing the Nation's forest resources. Today, with exploding populations voicing ever-growing demands for natural resources, planning is taking on added importance. The Forest Service and other land management agencies face demands from a variety of users. Often users perceive forest resource values in different--even conflicting--ways.

Sound land management planning requires consideration be given to people as well as the land. But how can the needs of people be satisfied, while maintaining the integrity of the land? First, planners must project future needs and demands, because planning is fundamentally a process of choosing objectives for the future and determining effective ways of realizing these objectives.

Land management planning takes place at many levels in the Forest Service. It ranges from the identification of National goals, objectives, targets, and policies by the Chief of the Forest Service to planning the day-to-day activities of Ranger Districts. This document was prepared to assist in Regional planning--a level of planning at which higher and lower levels of planning are coordinated.

In 1969, the Forest Service Chief named a task force to reexamine the mission of the Forest Service and develop a "Framework for the Future." New objectives and policies developed out of this mission in 1970. The redefined role of the Forest Service provided a "framework" for more specific policy development.

Regional planning guides were then prepared to provide broad management direction consistent with the Chief's "Framework for the Future." The Northern Region guide was completed in 1971 and revised in 1972. It was designed to provide land use planning direction for all of the Region's Forests.

In 1974, five planning areas were defined within the Northern Region. Each of the areas identified a part of the Region where economic lifestyles and natural resource characteristics are similar. Because of economic and resource similarities, the National Forests in each area require similar land management planning direction. Each area is unique, and information in the Area Analyses reflects the unique characteristics.

The Area Analysis is the first phase of the new Regional planning effort, which has the following objectives:

1. To provide information for the analysis requirements of the Resources Planning Act (RPA);

2. To provide direction for and coordination with lower levels of planning in the Forest Service;

3. To document the negotiation process which occurs during long range strategic planning by establishing policies, goals, objectives, and program outputs, and by determining the effects of the RPA Assessment Program on all National Forest programs. Negotiation takes place between the National and Regional levels of the Forest Service, and between the Regional and lower levels (National Forests, States, and Research units);

4. To have the capability to address planning issues that surface below the National level and which transcend established administrative boundaries; and

5. To coordinate with other regional agencies' programs and plans.

The Area Analyses prepared for the Northern Region will be used to establish a management program aimed at meeting these objectives. The Analyses are designed to accomplish the following:

a. Apply RPA Assessment and Program information to an area level of planning;

b. Provide an assessment of the areas' resources, along with the effects of National Forest management activities.

c. Help determine future demands for the areas' resources.

d. Provide information for identifying issues and for helping resolve issues.

e. Providing information on the relationship between resources and resource management on National Forest lands and lands of other ownerships or administrations.

This Area Analysis of Western Montana represents a single, but important phase of the Regional Planning process. Together, the five Analyses will be used to develop another document, a "Regional Situation Overview," along with a list of issues related to use of National Forest Resources in the Northern Region. Completion of this document is scheduled for June, 1978. From it, an interim Regional plan will be developed to provide planning and management direction through 1980.

Preparation of the interim Regional plan will lay the groundwork for the final Regional plan, to be completed in 1981. The final Regional Plan will be responsive to the 1980 RPA Assessment and Program for the Nation. It will define the goals, objectives, targets, and policies of the Northern Region's National Forests that are necessary to help meet the Nation's long range needs for renewable forest and rangeland resources.

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NATIONAL FOREST LAND MANAGEMENT PLANNING

4.1 NATIONAL DIRECTION

National Forest land management planning must uphold certain legislative, executive, and judicial mandates. The laws, regulations, and objectives discussed in this section provide the Forest Service National direction. Planning at all stages, from the Regional level to project plans, remains consistent with National direction.

4.11 Legislative Direction

Several Federal laws direct management of National Forests. The more significant laws for Regional planning are listed below.

1. Creative Act, 1891
2. Organic Act, 1897
3. Multiple Use Act, 1960
4. Wilderness Act, 1964
5. National Trails System Act, 1968
6. Wild and Scenic Rivers Act, 1968
7. National Environmental Policy Act, 1969
8. Federal Water Pollution Control Act, 1972
9. Endangered Species Act, 1973
10. Resources Planning Act, 1974
11. National Forest Management Act, 1976

4.12 Executive Direction

Executive direction also influences land management on National Forests. Budget decisions, executive interpretation of legislative and judicial mandates, executive orders, and other directions are all important. The most direct and easily understood forms of executive direction are those delegated to the Secretary of Agriculture and Chief of the Forest Service; they must interpret legislative, presidential, and judicial mandates and develop Forest Service policies that support the interpretations.

The Forest Service has Federal responsibility for National leadership in forestry. This includes participation in setting National priorities, formulating programs, and establishing Federal policies that relate to man and his natural environment, especially the forest environment. In carrying out its role as a land management agency, the Forest Service undertakes a wide variety of activities, including administration of: (1) the National Forest System, (2) Cooperative State and Private Forestry Programs, (3) Forestry Research, and (4) the Human Resource Development Program.

The Chief's "Framework for the Future," and Forest Service Manual (FSM) 1033 have established 11 objectives which describe the mission of the Forest Service:

1. Promote and achieve a pattern of natural resource uses that will best meet the needs of people now and in the future.

2. Protect and improve the quality of air, water, soil, and natural beauty.

3. Help protect and improve the quality of the open space environment in urban and community areas.

4. Generate forestry opportunities to accelerate rural community growth.

5. Encourage the growth and development of forestry-based enterprises that readily respond to consumers' changing needs.

6. Seek optimum forest land ownership patterns.

7. Improve the welfare of underprivileged members of society.

8. Involve the public in forestry policy and program formulation.

9. Encourage the development of forestry throughout the world.

10. Expand public understanding of environmental conservation.

11. Develop and make available a firm scientific base for the advancement of forestry.

4.13 Judicial Direction

The judicial branch of government plays an influential role in determining National land use policy. By interpreting the intent of laws and by applying the law in key situations, courts set precedents which sanction or prohibit certain land uses.

Court decisions often have far-reaching effects. A timely example is the recent District Court decision that clearcutting practices implemented by the Forest Service in West Virginia's Monongahela National Forest were in violation of the Organic Act of 1897. Decisions interpreting and applying the intent of the National Environmental Policy Act, the Wilderness Act, and the Multiple Use-Sustained Yield Act have also provided National land use direction.

4.14 Forest Service Direction for State and Private Forestry Activities

Many agencies have legal authority to provide advisory, technical, and financial assistance to all types of landowners.

The U.S. Department of Agriculture (USDA) is the most active of the Federal Departments in providing services that significantly affect land treatment and use. The Forest Service has general leadership for the U.S. Department of Agriculture cooperative activities on forested and brush-covered lands. This authority pertains to all USDA programs, even in cases where other agencies have the prime responsibility.

The Soil Conservation Service is responsible for coordinating Department of Agriculture water development and watershed matters. It also provides technical assistance regarding soil and water conservation, watershed protection, flood prevention, and resource development affecting private crop and pasture lands. Most USDA programs to improve watershed management and land use practices require cooperation among agencies and landowners.

4.2 LAND MANAGEMENT PLANNING SYSTEM FOR NATIONAL FORESTS

In addition to contributing to National land use planning, National Forest land management planning promotes the accomplishment of Forest Service objectives. Planning takes place at all levels of the Forest Service to maintain the intent of National goals and objectives. The broad planning direction that comes from the Chief is progressively translated into more specific planning action at the Regional, Forest, and District levels of the organization.

The first stage of planning takes place on the National level and involves Congress, the President, the Secretary of Agriculture, and the Chief of the Forest Service. Congress passes laws (like the Resources Planning Act, the Multiple Use-Sustained Yield Act, etc.) which affect land use. The President, through the Secretary of Agriculture, sets guiding policy and program standards. The Chief must translate these legal and executive mandates into broad policy directives, such as Framework for the Future, RPA Program, and an Annual Program and Work Planning Advice.

The second stage of planning takes place at the Regional level, where laws and the Chief's directives are interpreted and implemented on the Region's Forests. The Regional Plan, Program Budget, and Goals and Objectives provide Forests with management direction consistent with National objectives.

The third and fourth planning stages occur at the Forest level, where National and Regional direction is implemented on a particular Forest. Forest land and resource management plans are prepared which contain long range goals, objectives, targets, and policies consistent with the Regional plan. These decisions guide and direct the management of the National Forests and Grasslands toward fulfilling National and Regional goals, objectives, and targets, with appropriate consideration for local concerns and needs.

The fifth, and final, stage of planning is project planning, which directs projects associated with more specific management activites. Project planning generally takes place on the District level. Although these stages of planning are closely related, activity plans answer general questions such as "how much?" and "when?", while project plans answer the more specific questions "how will it be done?" and "who will do it?"

4.3 THE PLANNING PROCESS

People value Forests for different reasons and seek to use Forests in different ways. Some perceive tangible values, such as those derived from wood, water, forage, wildlife, and recreation; these values can be measured in dollars, AUM's, acre-feet, recreation days of use, etc. Others perceive intangible values like a fiery sunset over an alpine lake, the solitude of wilderness, the timeless creaking of a 200-year-old larch snag; these are intangible values which often defy measurement, but which are important to people.

Forest land management planning involves consideration of both tangible and intangible values. Forest Service objectives are designed to satisfy the demands of a diverse public, and multiple use management provides a combination of public benefits.

Planning designed to consider diverse needs requires a process to identify, measure, evaluate, and relate pertinent social, economic, and ecological resource information. Thus, the Forest Service has identified eight factors which should be considered at all stages of land planning:

1. Legal requirements and authorities: The legislative, judicial, and administrative framework for the plan must be defined.

2. Planning and management objectives: National objectives must respond to certain local and National needs. Because of the interrelationships among objectives of different Federal, State, and local political entities, the Forest Service must clearly identify the role of National Forests.

3. Management Situation: When planning, the present must be described before the future can be considered; the existing situation becomes the benchmark from which the future is launched. Characteristics of the land, its natural biologic communities, and human use of the land must be measured and evaluated.

4. Land capability and land use opportunity identification: Land characteristics (such as soils and topography) can describe the productivity of the land and its sensitivity to disturbance. Because changes in land characteristics normally occur over long periods of time, land capability is also of long-term nature. By describing land characteristics and determining what uses the land is capable of sustaining, land use opportunities can be defined.

5. Basic assumptions: People's future needs and demands for particular resource uses must be estimated. From these estimates, assumptions about the nature and magnitude of expected change can be made.

6. Alternative plans: Land use opportunities and assumptions are structured into alternative plans which reflect a range of management options. At minimum, alternative plans are prepared to emphasize commodity-oriented management, amenity-oriented management, and several combinations of the two.

7. Analysis and evaluation: Each alternative plan is examined to determine the benefits, costs, and trade-offs that would result from its implementation. The impacts of each plan on the human and natural environment are also assessed.

8. Plan selection: Considering both alternative plans and the public's response to plans, the responsible Forest Officer selects the plan offering the most favorable long- and short-term benefits. The choice is made after [redacted] analysis of how available resources can be managed to satisfy existing and future needs and demands. The rationale for the decision is documented.

Two vital elements must be included throughout the Forest Service planning process: an interdisciplinary approach and public involvement. These elements are required by the National Environmental Policy Act, National Forest Management Act, and by executive direction. Public participation and coordinated social, economic, and ecologic resource planning are vital to the preparation of objective and credible land use plans.

The Area Analysis Phase of Regional Planning involves consideration of the the first five of the above factors; development of alternative plans, analysis and evaluation, and plan selection will occur in the final stages of the process.

THE PLANNING AREA: AN INTRODUCTION

5.0 THE PLANNING AREA: AN INTRODUCTION

The Western Montana Planning Area extends from the mountains forming the Idaho-Montana border eastward to the Continental Divide, and from the Canada-Montana border south to the Idaho-Montana line (see figure 1). It encompasses approximately 13.2 million acres. All of 7 counties, and portions of 3 counties lie within the Planning Area. Table 1 shows land ownership in Western Montana.

Western Montana is unique in that the majority of land is in Federal ownership--and 92 percent of all Federally-owned land in the Area is under the jurisdiction of the National Forest Service. The Flathead, Lolo, and Kootenai National Forests, and portions of the Bitterroot, Kaniksu, Deerlodge, and Helena Forests cover 62.5 percent of the Planning Area. Commodity and noncommodity resources from the National Forests are important to Area lifestyles and economies. Too many residents, the abundance of natural resources is the most valued characteristic of Western Montana.

In comparison to most other parts of the United States, Western Montana has a very low population density--about 8 persons per square mile. Populations are concentrated in cities and smaller communities, often separated by many miles of open space. There are distinct lifestyle areas in Western Montana, but to a large degree, each is strongly influenced by geographic location and by resource uses on surrounding land.

Wood products is the most prominent industry in the Area, followed by the Federal Government. Many Federal Government workers are employed by the Forest Service. The Area's wood products industry is strongly dependent on timber harvest from the National Forests, and most timber cut from the National Forests is processed within the Area.

Water production is an important resource of the Planning Area--western Montana adds large quantities of water to the Columbia River system each year; the majority of this water originates on National Forest land. Hydropower plants are the main source of electricity in the Area, and water is also important for grazing, wildlife and fisheries, recreation, and domestic and industrial uses.

Both National Forest and private lands provide year-long habitat for a variety of wildife, including two endangered species--the Northern Rocky Mountain wolf, and the peregrine falcon. The grizzly bear, a threatened species, is also present in the Area. Outstanding fishing streams (such as Rock Creek), and high-quality hunting areas, attract fishermen and hunters from many parts of the United States.

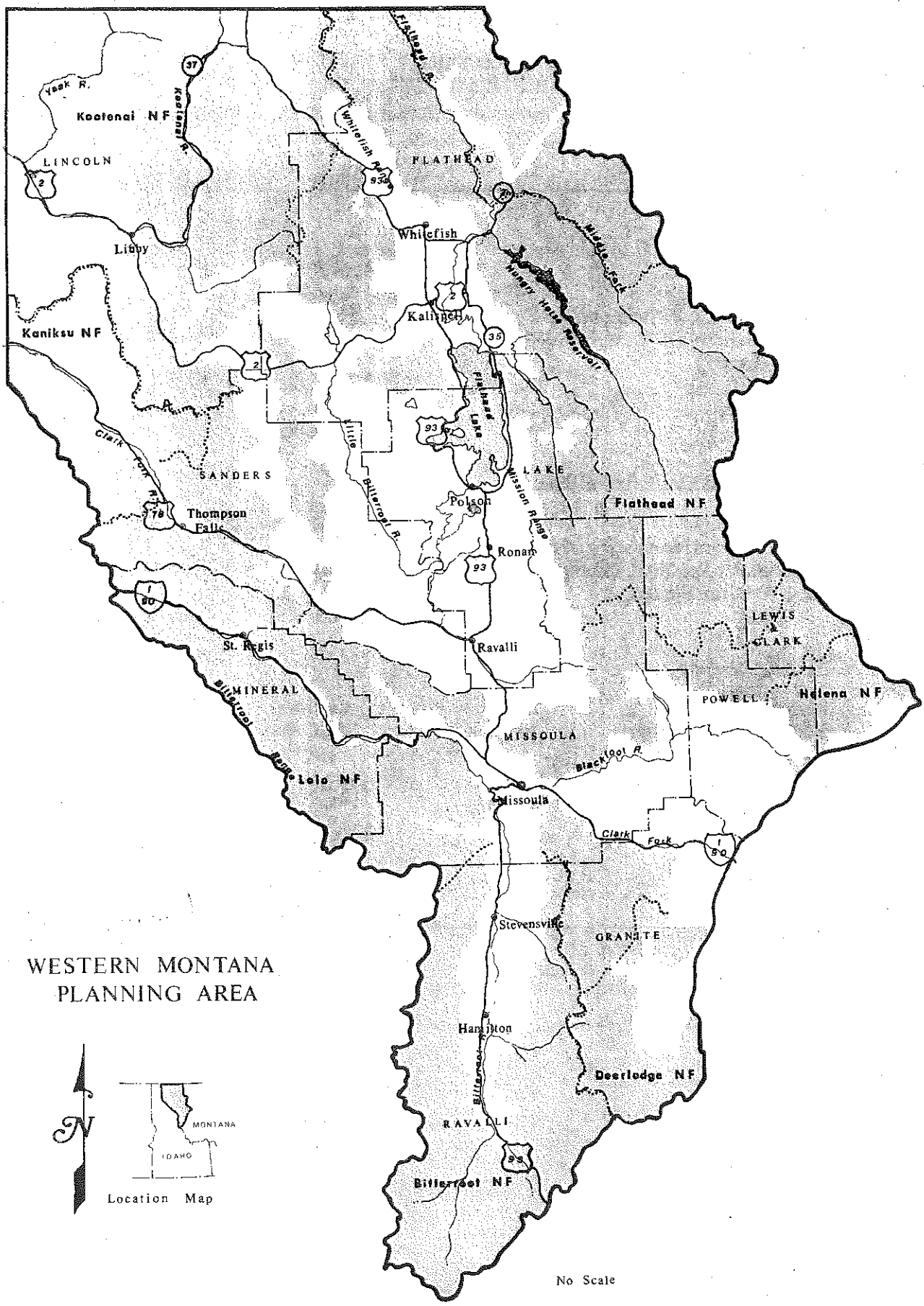
Yaak R.
Kootenai NF
Kootenai R.
Whitefish R.
Flathead R.
LINCOLN
FLATHEAD
Libby
Whitefish
Kalispell
Kaniksu NF
Hungry Horse Reservoir
Middle Fork
Flathead Lake
Clark Fork R.
Little Bitterroot R.
SANDERS
LAKE
Mission Range
Polson
Flathead NF
Thompson Falls
Ronan
LEWIS & CLARK
St. Regis
Ravalli
MINERAL
Bitterroot Range
POWELL
Helena NF
MISSOULA
Blackfoot R.
Lolo NF
Missoula
Clark Fork
Stevensville
GRANITE
Hamilton
Deerlodge NF
Bitterroot R.
RAVALLI
Bitterroot NF
WESTERN MONTANA
PLANNING AREA
MONTANA
IDAHO
Location Map
No Scale

Table 1

LAND OWNERSHIP
WESTERN MONTANA PLANNING AREA

OWNERSHIP	Acres	Percent of Total Acres
Federal		
Forest Service	8,277,500	62.5
Park Service	627,800	4.7
Bureau of Land Management	99,400	.8
Bureau of Sport Fisheries & Wildlife	20,900	.2
Other (Army)	7,000	--
TOTAL	9,032,600	68.2
Indian	647,000	4.9
State, County, & Municipal		
State Forests	446,300	3.4
Montana Department of Fish & Game	34,200	.3
Department of State Lands	28,700	.2
City & County (est.)	400	--
TOTAL	509,600	3.9
Private		
Timber Industry	843,500	6.4
Burlington Northern	600,000	4.5
Montana Power	19,200	.1
SUBTOTAL Large Private Lands		
Other Than Ranches	1,462,700	11.0
Small Private	1,592,600	12.0
TOTAL	3,055,300	23.0
TOTAL	13,244,500	100.0

Western Montana National Forests contain all or portions of 6 classified wildernesses. New Study Areas and inventoried roadless areas make additional contributions to the Area's wildland resource. These vast tracts of undeveloped land provide opportunities to experience environments unmodified by man, and serve as a reminder of our American heritage. They are important to people from outside Western Montana as well as to Area residents.

People from all over the Nation are attracted to Western Montana because of its outstanding recreational resources. The Area's National Forests provide opportunities for numerous forms of outdoor recreation, and there are additional facilities [redacted] on State and private lands.

The Area is also rich in cultural resources. Ghost towns, the Lewis and Clark and Continental Divide Trails, and other historic sites remind us of the past--ways of life of the Indians who were Western Montana's first human inhabitants, and of trappers, traders, and pioneers who settled in this country.

Analysis

These are some of the significant features that combine to make the land, people, and lifestyles of Western Montana unique. The following sections of this [redacted] contain resource assessments and projections and assumptions about future demands for [redacted] the Area's resources. These assessments, assumptions, and projections will help determine how Western Montana can meet the many demands for its resources in an environmentally, economically, and socially acceptable manner. When considered with other such guides, it will help understand the Area's role in meeting Nationwide demands for resources.

THE PLANNING AREA: AN OVERVIEW

PHYSICAL SYSTEMS

6.13 TOPOGRAPHY

The topography of the Planning Area ranges from alluvial bottomlands to steep mountainous areas. Areas that were continentally glaciated have a more subdued appearance than the remainder of the area. Areas where there was alpine glaciation are more rugged, with U-shaped valleys, cirques, aretes, and lakes. This is due to the scraping and filling action of the ice. In those portions of the Area left untouched by the glacier, there are mostly very steep hills, some rolling hills, and V-shaped drainages.

The lowest elevation in Montana, 1,825 feet, is [redacted] where the Kootenai flows out of the State. Most of the State's major valleys are lower than 4,000 feet in elevation. Some of the higher peaks in Montana climb to 10,000 feet.

Most of the Clark Fork, Kootenai, and Upper Flathead River Valleys in western Montana are narrow (less than 2 miles wide). The Bitterroot and Flathead Valleys range from 12 to 18 miles wide.

Most mountain ranges in western Montana run north or northwest to south or southwest.

6.12 CLIMATE

Western Montana's climate represents a transition between north Pacific coast and continental United States climates. The Pacific coast influence is most evident in the increased cloudiness and precipitation in the Area during autumn and winter; Montana east of the Continental Divide does not feel this influence. Conversely, the Divide often shields the Planning Area from the cold, dry Arctic air fronts experienced in eastern Montana.

A. Precipitation: Average annual precipitation varies throughout the Area, depending on elevation and topography. Precipitation ranges from 13 to 17 inches a year throughout most of the Bitterroot and Flathead Valleys to around 30 to 35 inches a year in the northwestern and northeastern portions of the area (at locations such as the Haugan, Heron, and Sylvanite Ranger Stations, Hungry Horse Dam, and Swan Lake). At elevations of 5,000 feet or above, precipitation reaches 50 to 75 inches a year or greater in much of the mountainous country, except in the southeastern portion of the Lolo National Forest and the extreme southern portion of the Bitterroot Forest. Snowfall of 600 inches a year or greater in the mountains accounts for a large percentage of this precipitation; in comparison, the Bitterroot Valley receives about 30 inches of snow annually. In the Area's wetter mountains, 60 percent or more of the annual precipitation comes between November and March, with November, December, and January the wettest months. In the Bitterroot and Flathead Valleys, most precipitation is in June--only 35 to 43 percent of precipitation falls between November and March in these valleys. July and August are usually the clearest and driest months at all elevations.

B. Temperature: Temperatures throughout the Area are affected by a north-south atmospheric gradient, along with elevation and topography. Average temperatures at 5,000 and 10,000 feet in elevation differ by about 5°F in January and 8°F in July. Despite the north-south gradient, the average annual temperature in the northwestern portion of the Area is the same as in the southern Bitterroot Valley--45°F. This is because valleys and canyons in the northwest are at lower elevations than in the Bitterroot Valley. Annual averages as low as 40°F occur in some of the northern-most valleys, such as in the Swan Valley below 4,000 feet.

In the valleys, monthly temperature averages vary from 18 to 26°F in January to 60 to 68°F in July. Daily temperature variations in these months range from 15 to 20 degrees in January to 35 to 40 degrees or greater in July. Average monthly temperature in mountains is 15°F in January and 58°F in July. Monthly averages for mountains are relatively high in comparison to averages for valleys because the effects of nighttime temperature inversions are minimal in the mountains. Daily temperature variations in the mountains vary from 10 degrees in January to 20 degrees in July.

Since 1930, the highest temperature in the Area has been 109°F, and the lowest -45°F.

C. Fire Climate: The season of moderate or greater fire danger in Western Montana generally begins in late June or early July and lasts until late August or September. Fire danger is governed by the progressive drying (or the rewetting) of various forest fuels. The degree of dryness or wetness determines the ease with which a fire can be ignited, and its potential intensity and ability to spread. Seasonal temperature, humidity, and precipitation regimes affect fuel moisture. These regimes are quite similar throughout the Planning Area, but differences in elevation, geography, and topography also influence the degree of fire danger.

1. Precipitation: Showers are characteristic throughout the Area in late spring--normal June rainfall in valleys and lower canyons ranges from 1.8 inches at Libby and Troy to 3.4 inches at Hungry Horse Dam and West Glacier. July rainfall drops about 0.7 inches at Libby and Troy and 1.4 to 1.5 inches at Hungry Horse and West Glacier, with only about 0.5 inches more falling on adjacent mountaintops. August rainfall is generally similar, although it increases a few tenths of an inch in the northwest portion of the Area. In the final 10 days of August, there is an average increase in rainfall throughout the Area. During September and October, the Bitterroot and Flathead Valleys receive little or no additional increase in precipitation, but canyons in the northwest portion of the Area and around Hungry Horse receive 3 to 4 inches during October.

2. Temperature: With clearing, drying weather conditions in the valleys, afternoon temperatures show an average increase of 11°F between June and July, as compared with an average increase of only 6°F between May and June. Average daily minimum temperatures increase about 10 degrees in the mountains between June and July, but only 3 to 4 degrees in the valleys, which feel the effect of more frequent and stronger nighttime inversions.

July temperatures at 4 p.m. generally average between 78 and 82°F in the valleys and canyons below 4,000 feet; in August, temperatures at 4 p.m. average 2 degrees lower. Readings in the mountains at 4 p.m. reflect elevational temperature decreases averaging between 3.5 and 4.5° per 1,000 feet. At 7,000 feet, temperatures are between 62°F in the extreme northern portion of the Area, and 68°F in the extreme southern portion of the Area in July. Afternoon temperatures generally decrease 10 to 11°F in the mountains from August to September.

3. Relative Humidity: There is an inverse relationship between relative humidity, and temperature and rainfall. Midafternoon relative humidity averages in the valleys decrease from around 45 percent in June to between 28 and 32 percent in July and August, then increase to above 40 percent in September. In the mountains, averages are near 40 percent in July and August.

4. Lightning: Lightning, which is the primary cause of fires, is most frequent in July and August. Within a 20-mile radius of mountain fire lookouts, the average number of days in which lightning occurs during this 2-month period ranges from 8 to 10 in the far northwest to 15 to 17 in the extreme southern portion of the Area.

6.13 GEOLOGY

Geologic time is divided into four eras, each of which has lasted many millions of years. Geologic eras are, from most recent to oldest: 1) the Cenozoic Era - present to approximately 70 million years ago; 2) the Mesozoic Era - approximately 70 million to approximately 225 million years ago; 3) the Paleozoic Era - approximately 225 million to approximately 550-600 million years ago; and 4) the Precambrian Era - approximately 600 million to at least 3.5 billion years ago.

The oldest rocks exposed in (Western) Montana are complex Precambrian metamorphic rocks called gneisses (nices), schists, quartzites, and marbles. They are at least a few billion years old. It is likely that most of these rocks were originally deposited in ancient seas and lithified to form sedimentary rocks (sandstones, shales, and limestones). These rocks have been intensely altered by high temperature and pressure characteristic of deep burial. The present fused, foliated, and compressed appearance of these metamorphic rocks bears little resemblance to their original appearance. Some of these oldest rocks may have originally been igneous rather than sedimentary. These metamorphic rocks are referred to as the basement complex of Western Montana. Perry (1962) suggests that these basement complex rocks are the erosional remnants of early Precambrian mountain ranges. They are exposed at the surface only near the centers of great uplifts in southwestern Montana, for instance, in the Tobacco Root Mountains southeast of Butte.

During the Late Precambrian, a great thickness of mostly fine-grained sediments, referred to as the Belt Supergroup, was deposited on a block of continental crust in a slowly sinking basin (Harrison, 1977). The measured thickness of Belt rocks is at least 40,000 feet (Harrison, 1963). The total thickness of Belt rocks is much greater. Nowhere is the Belt Supergroup exposed in its entirety, and nowhere are the top or the bottom strata exposed.

The Precambrian Belt basin covered roughly northern Idaho and northwestern Montana. According to Harrison (1974), sediments were apparently deposited in the basin over an enormous time span, from approximately 1500 million years ago to 850 million years ago. Apparently there was not very much igneous activity in the Belt basin during the Late Precambrian. As a result, age dating of the Belt Supergroup has been difficult. Some intrusions known as the Purcell dikes, sills, and flows did occur in northwest Montana near the beginning of Belt Supergroup deposition. Fossil evidence is not well preserved within the Belt Supergroup. Some algal remains, called stromatolites, algal pods, and algal mats, are preserved in various locations (Gensamer, 1973).

Consolidated Belt Supergroup sediments were originally sandstones and shales, with some impure limestones. Over a long period of time, these were metamorphosed (altered) through burial and regional stresses to metasedimentary quartzites, argillites, and impure marbles. Correlation between formations and grouping of rock units within the Belt Supergroup is very difficult. This is due to changes in environments of deposition through time and space that result in the deposition of differing sediment types.

Structural deformation of Western Montana from the time of Belt sedimentation through the Late Mesozoic probably consisted of gentle north to northwest folding accompanied or followed by block faulting (Harrison et al., 1974). It appears that post Precambrian geologic structures in Western Montana, with the exception of the Late Cretaceous-Early Tertiary Idaho and related batholiths, have been influenced by the geometry, sedimentation, and structural pattern of the late Precambrian Belt basin.

The Paleozoic Era in Western Montana was characterized by successive advances and retreats of marine waters. During each invasion the area covered by water varied. As a result, the locations, thicknesses, and types of sediments of the same age are not the same throughout Montana. Paleozoic rocks primarily consist of limestones and dolomites. Sandstones and shales occur throughout the Paleozoic section, but are most abundant near the bottom and top of the section. Igneous activity during Paleozoic times was not significant. Perry (1962) estimates the overall thickness of Paleozoic strata to be between 5,000 and 10,000 feet. The majority of sediments deposited in Western Montana during the Paleozoic have subsequently been eroded away. Where Paleozoic rocks are present, it is largely a result of northwest trending Late Cenozoic block faulting, which has downdropped Paleozoic rocks in some locations (Pardee, 1950) and has minimized their exposure to erosion.

The Mesozoic Era in Western Montana was first characterized by the advance of seas into the southwestern portion of the State, followed by their retreat during the Triassic period. Later, during the Middle Jurassic period, another marine sea spread over almost the whole of Western Montana. Mostly sandy, shaly, and some limey sediments were deposited by each of these seas. Near the end of the Jurassic, marine waters withdrew from Montana but sand and mud continued to be deposited in river flood plains. Continental (deposited on land) deposition of sands and muds continued until Late Cretaceous time. The last advance of marine waters, from the south and east, into Montana began in Late Cretaceous time. The shoreline migrated back and forth across central and Western Montana, and the seas receded for the final time near the end of the Cretaceous. Throughout the Cretaceous, continental deposition continued west of this north-south trending shoreline.

Late Mesozoic to Early Cenozoic structural deformation in Western Montana includes the right lateral shear zone known as the Lewis and Clark line. This zone of crustal weakness, which partially parallels the Clark Fork River drainage, represents a west-northwest sedimentation trough active during early to middle Belt deposition (Harrison et al., 1974).

The northwestern Montana disturbed belt is an area of intense deformation along the Lewis and Clark Range. This disturbed belt parallels the northeastern edge of the Belt basin (Harrison et al., 1974). Precambrian Belt rocks have been thrust over Paleozoic rocks, and are displaced vertically by long normal faults (Kleinkopf and Mudge, 1972).

The building of the northern Rocky Mountains began during the Late Cretaceous, when there was intense folding and faulting. Subsequent igneous activity during the Late Cretaceous through the Early Tertiary was intense. The tremendously large Idaho batholith, over 100 miles across according to Perry (1962), formed the core of the Bitterroot Mountains. As it intruded upward within the earth's crust, it may have caused some Belt rocks to slide eastward, forming the Sapphire Mountains (Desormier, 1975, p. 30). There are also numerous smaller batholiths associated with the Idaho batholith. As the Idaho and related batholiths cooled, mineralizing solutions were probably expelled from the igneous rock into surrounding rocks.

The Cenozoic Era in Western Montana has been characterized by limited continential deposition of lake, alluvial, and volcanic sediments during the Tertiary period. During the mid-Tertiary, a much less intense period of shallow intrusive and extrusive igneous and volcanic activity also occurred in southwestern and Western Montana. This was followed by glacial erosion and deposition during the Pleistocene epoch, and by continental erosion and limited deposition during recent times.

At the beginning of the Pleistocene epoch, increased snowfall and a cooling climate caused a great thickness of ice to become compacted and to spread southward into northwestern Montana (Alden, 1953). The Pleistocene glacial period in Montana consisted of a number of glacial advances and recessions, but glaciers did not completely recede until the end of the Pleistocene. Rocks and soil were scraped and scoured from the surface as the continental glacier spread. The southernmost penetration of the continental glacier was in the vicinity of Polson. Tremendous amounts of unconsolidated, unsorted rock, boulder, and soil debris were carried along with the glacier. As it moved, some debris was deposited alongside the glacier as lateral moraines. The debris pushed along in front of the glacier was not deposited until the glacier stopped moving and began to melt and recede. Terminal and recessional moraines were formed in this manner.

Mountain valley glaciers were formed near the top of almost all mountain ranges during this time. These alpine glaciers moved down the valleys, scraping them into U-shaped features and depositing morainal debris. Many valleys which drain eastward from the Bitterroot Mountains exhibit the effects of alpine glaciation. As continental and alpine glaciers melted, continental sands and muds were deposited. Many small lakes were formed as meltwaters were dammed by recessional moraines.

Perhaps the largest feature formed during continental glaciation was glacial lake Missoula. According to Pardee (1910), north- and west-flowing rivers were dammed by the continental ice and formed the enormous lake. At its highest level, the lakeshore was around 4,200 feet, or about 1,000 feet higher than the city of Missoula is today (Alden, 1953). Remnants of the fluctuating shoreline may still be seen on hillsides surrounding Missoula. The lake flooded the valleys of the Clark Fork and Flathead Rivers and their tributaries south of Polson. At one time it covered an area of approximately 2,900 square miles (Pardee, 1942). Fine-grained sediments were deposited in glacial lake Missoula until the lake finally breached the ice dam during the final glacial recession and completely emptied, near the end of the Pleistocene epoch, flooding westward into the Columbia River plain.

X

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BIOLOGICAL SYSTEMS

6.2 BIOLOGICAL SYSTEMS

Biological systems, by definition, include all the living components of an area. Interrelationships exist among the living elements and among the living and nonliving elements of an ecosystem, resulting in complex systems with an infinite number of interrelated components.

Biological systems are in constant change, and the components and interrelationships among components change with time. The plant species present in a particular area are the result of many physical factors. Fire is also a determining factor in the kind of vegetation present in certain areas. The presence of particular animal species is dependent on existing vegetation and physical factors. To facilitate understanding of biological systems, large areas are stratified into smaller ecosystems, or vegetative zones. Information about vegetative zones is important to land management decisions.

A. Vegetative Zones: Vegetation in Western Montana changes greatly in short distances because of mountainous terrain. Seven major vegetative climax zones in the Area have been identified, based on the predominant plant species. Beginning at the lowest elevation, the zones are: grassland, ponderosa pine, Douglas-fir, grand fir-hemlock, temperate spruce-fir, subalpine spruce-fir, and alpine tundra. As elevation increases, there is a decrease in temperature and an increase in annual precipitation. Figure 2 shows the elevations where these seven zones are usually found in the central and western portions of the Planning Area; in the northern portion of the Area, zone elevations are lower. There are no grassland and pondersoa pine zones in some parts of Western Montana.

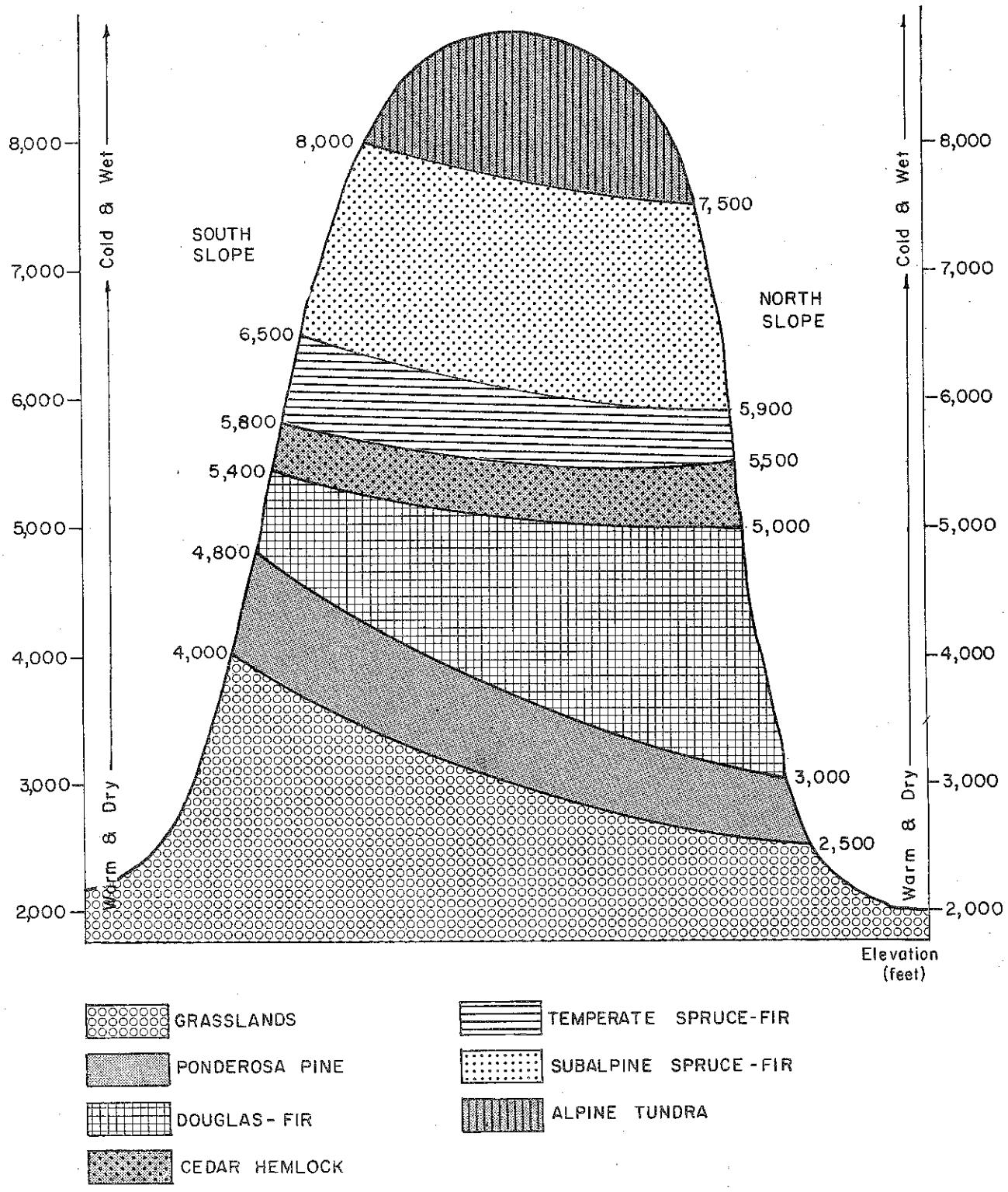
1. The grassland zone is too dry to support tree species except on the most favorable microsites, which are generally adjacent to stream courses.

2. The ponderosa pine zone begins at the upper limits of grasslands with scattered trees or sparse, park-like stands of ponderosa pine. Fires have been instrumental in maintaining grasslands free of trees and "open forest" pine stands by thinning and pruning existing stands. Absence of fire results in more trees and a reduction of grass. Historically, fires in this zone have occurred at intervals of 5 to 25 years.

3. In Western Montana, the Douglas-fir zone is by far the largest of the seven zones. It produces the most important commercial tree species--Douglas-fir--often mixed with ponderosa pine, western larch, or lodgepole. This zone can be divided into warm, dry and cool, dry sites.

Frequent fires on warm, dry sites result in open ponderosa pine stands with grass, forb, and low shrub understories. In the absence of fire, a Douglas-fir understory develops and, in time, becomes the dominant species in the

VEGETATIVE CLIMAX ZONES



overstory. Douglas-fir stands are generally thick, with less grass, forb, and shrub understory than in ponderosa pine stands. Elk and deer use the sites for winter and spring range. Fire has historically occurred at 5- to 25-year intervals on warm, dry sites in this zone.

On cool, dry sites, Douglas-fir is often the dominant tree species in all successional stages. Understories are composed of shrubs and grasses, except under very thick stands of regeneration, where few understory plants can survive. Following fire, ponderosa pine, western larch, and lodgepole pine are favored. Foraging wildlife are abundant following fire, but their numbers decrease as the tree canopy closes. Fires have occurred at less frequent intervals on cool sites than on warm sites. The average period between fires has been 30 years.

4. The cedar-hemlock zone contains the most productive forest land in the Planning Area. It is found primarily in the northwest corner of the Area. In the more moist and least disturbed portions of this zone, cedar and hemlock (the climax species) predominate. However, in portions that have been disturbed by wildfire, western larch, western white pine, and spruce predominate. A mixture of species is common in this zone, but the size of the zone is usually small. While fire occurs infrequently in this zone, every 100 to 500 years a significant number of trees are killed by large, high-intensity fires.

5. The temperate spruce-fir zone is also relatively productive. In the moistest portions, such as streambottoms and poorly drained benches at moderate elevations, spruce is the only conifer that can survive. In less moist areas, subalpine fir is often the climax species; although lodgepole pine or western larch typically dominate subalpine fir sites following fire disturbances. Fire has occurred infrequently--from 75 to 200 years apart--in the past, but fires are usually large and of high intensity, killing a substantial amount of the trees.

6. The subalpine zone is generally the highest-elevation zone; it forms the upper timberline. Little timber is produced in this cold, snowy environment. Small, low-intensity fires occur quite frequently in this zone, but have no significant effect on vegetation. However, larger, high-intensity fires which occur infrequently (from 150 to 500 years apart) have a significant effect. On severe sites, revegetation following a very intense fire may take decades, and tree cover often does not develop for many more decades.

7. The alpine tundra zone, above timberline, occupies a very small area on the highest mountain ranges. Vegetation consists of grasses, forbs, sedges, dwarf shrubs, mosses, and lichens. Fire is very uncommon in this zone, and is not an important management consideration.

B. Subseries Groups of Forest Habitat Types: Subseries groups, a refinement of the broad forest vegetative zones, have also been identified for coniferous forests in the Planning Area. They represent an intermediary group between the above-mentioned broad vegetative zones and more specific plant communities (habitat types).

The groups were defined by their physical environment--soil, slope, aspect, elevation, physiographic site, and climatic factors. All factors interact to affect temperatures, available moisture and nutrients, and length of the growing season. Characteristics of each of the eight groups are discussed below. The relationship between forest zones and vegetative groups is shown in Figure 3.

Certain animal species are commonly found within a particular vegetative zone. Other species have broader habitat and range requirements and are not associated with a single vegetative system. Wildlife commonly found in particular zones are included in the following subseries group descriptions.

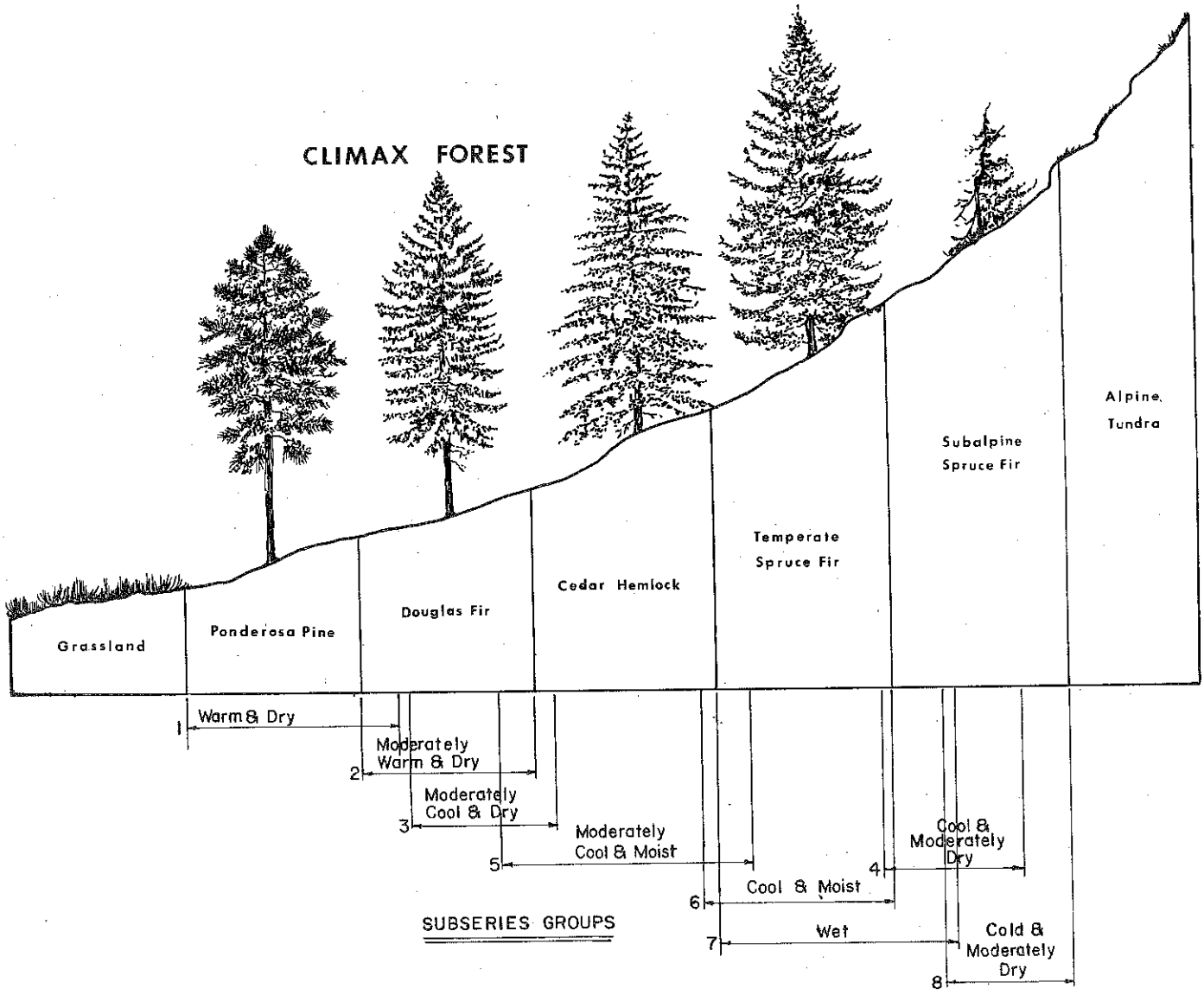
Section 7.5 of this guide (timber resource) contains information on the timber-producing potential of each subseries group.

Group 1 (Warm and Dry): This group is normally found at lower elevations on south aspects and is characterized by open-grown ponderosa pine or Douglas-fir; a bunchgrass community typically dominates the understory. Sites are warm and dry with shallow and/or rocky soils. Big game make extensive use of this habitat for winter range. It also provides excellent cattle range. Blue grouse breeding grounds are common. Limited streamflow originates from this group. The grass-dominated understory generally recovers well after fire; however, soil-disturbed areas, such as roadcuts, are very difficult to revegetate.

Group 2 (Moderately Warm and Dry): Lower elevation stands in this group are mixed Douglas-fir and ponderosa pine with a shrub understory; this type of stand is found on all aspects. Pinegrass understories are normally confined to ridgelines or benches. On some north slopes, as elevation increases, ponderosa pine becomes less evident and lodgepole pine becomes more prevalent. Portions of this group are key areas for big game winter range. It has a moderate potential for producing livestock forage, particularly on transitory range created by cutting. Most elk calving occurs in this group. Blue grouse breeding grounds are present in this habitat. Water production is moderate and vegetative recovery is relatively slow. Wildfire can have serious impacts, but prescribed fire can be effectively used for management purposes.

Group 3 (Moderately Cool and Dry): Stands in this group are dominated by Douglas-fir, with minor amounts of ponderosa pine. There are significant amounts of lodgepole pine and grand fir in some stands. The understory is

SUBSERIES GROUPS OF FOREST VEGETATIVE ZONES



dominated by beargrass and huckleberry on all aspects, and by pinegrass on ridges and dry, south slopes. This type of habitat is typically used for spring-fall feeding by big game, and ridges are frequently used by wildlife as resting areas during the day. Forage productivity is marginal and water production is higher than it is for Group 2. Vegetative recovery is slow.

Group 4 (Cool and Moderately Dry): The typical stand in this group is characterized by essentially pure stands of lodgepole pine with an understory of beargrass, huckleberry, and grouse whortleberry. Heavy amounts of down material are common. On the moister sites, varying amounts of subalpine fir, Engelmann spruce, and Douglas-fir are found in association with lodgepole pine. This subseries group provides excellent escape cover for big game. There is little forage for livestock. The group is a high water producer. Vegetative recovery after disturbance is generally slow.

Group 5 (Moderately Cool and Moist): This group occurs in areas where temperature and moisture approach optimum conditions for vegetative growth--on northerly slopes, stream bottoms, moist benches, and at lower elevations on southerly aspects. Stand composition varies from pure spruce to mixtures of Douglas-fir, larch, grand fir, cedar, and hemlock. Lodgepole pine is usually present, but ponderosa pine is rare. Understory components with this group vary greatly. They can be floristicially rich; however, under heavy timber canopies, the forest floor may be almost devoid of undergrowth. Minor to moderate amounts of big game winter range are found in this habitat type and if logged, it may have a high forage value for cattle.

Group 6 (Cool and Moist): Group 6 is found on moist north-facing slopes, stream bottoms, and moist benches. Stands are composed of various mixtures of Douglas-fir lodgepole pine, larch, subalpine fir, and spruce. Livestock use is low, but big game make moderate to heavy use of this group during summer and fall. Franklin and blue grouse are common in this type of habitat. Water production is generally high and vegetative recovery is relatively rapid.

Group 7 (Wet): This group is characterized by soils saturated for periods of time sufficient to cause soil mottling. Various mixtures of subalpine fir, spruce, Douglas-fir, and lodgepole pine are common. Ponderosa pine is rare. Stands are generally situated along streams, on wet benches, or at drainage heads. Cold air drainages may be associated with the group. Understory components are highly variable in amount and composition. Under heavy timber canopies, the forest floor may be almost devoid of undergrowth. Soils are moist year-round; thus, temperature is often the limiting growth factor. Roadcut slumping is a major problem. Forage production is low for cattle and moderate for big game. Moose use the area as a primary feeding ground and elk use wallows and cool slopes during hot summer days and during their breeding season. Water production is high and vegetative recovery relatively rapid. The group is relatively fire resistant, even in major fires.

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Group 8 (Cold and Moderately Dry): Stands in this group are often highly variable in density and composition. These habitats are generally above the limits of larch and Douglas-fir. Lodgepole pine is an important stand component of the group at lower elevations; whitebark pine and subalpine fir are the major species at higher elevations. Lesser amounts of Engelmann spruce and pockets of alpine larch are common. Understories are equally variable; south slope stands are typically open, with scattered grouse, whortleberry, or beargrass. Bare soil or rock is often exposed, and vegetative recovery is extremely slow. Within this habitat type, there is a diversity of vegetation but recovery is still slow because the growing season is short. The group often contains favorite summering areas for elk and may support goat and mountain sheep populations. Water yields are very high.

AN HISTORICAL PERSPECTIVE

6.3 HISTORICAL PERSPECTIVE

The first white men to pass through the Planning Area were French fur traders in the 1790's. At that time, the Area was home to the Kootenai, Pend d'Oreille (Kalispell), and Flathead (or Salish) Indian tribes. These native Americans lived in the mountain valleys of Western Montana and made expeditions to hunt buffalo on the plains east of the Continental Divide.

The Lewis and Clark Expedition passed through the southern portion of the Planning Area in 1805 and 1806. Shortly thereafter, British Canadian fur trappers and traders led by David Thompson explored the Area and built fur-trading posts on the Kootenai and Clark Fork Rivers. The fur trade expanded and flourished until the 1840's when beaver hats went out of style.

In 1841, St. Mary's Mission was established in the Bitterroot Valley by the Jesuit missionary, Father DeSmet. The mission was the first permanent white settlement in Montana. Another Jesuit missionary, Father Ravalli, took over the mission in 1845 and built a sawmill and flour mill. In 1850, the church buildings were turned over to an early settler, John Owen, and were converted into a trading post which served prospectors, surveyors, Indians, and traders.

The influence of white men extended into the Mission Valley in 1954, when the Jesuits built the St. Ignatius Mission. The next year, treaty negotiations were concluded with a confederation of Kootenai, Pend d'Oreille, and Flathead tribes.

The Area was made more accessible when Captain John Mullan completed a wagon road through Western Montana in 1860. In 1863, this wagon road was extended to Walla Walla, Washington, providing the first direct tie between the heads of navigation on the Columbia and Missouri Rivers.

Following the rich gold strike at Bannack in 1862, there was an influx of prospectors and miners. There were numerous active mining camps in Western Montana through the early 1900's. Many streams in the Planning Area were extensively altered by dredging and other forms of placer mining.

In 1883, construction of the Great Northern Railroad line across Montana was completed. When the line was tied to Seattle in 1893, Great Northern became the first of the northern transcontinental railroads.

Western Montana's lumber industry was born out of the need for lumber and fuel for early settlements, mines, smelters, railroads, and utilities. Numerous small mills met local needs for lumber. Somers Lumber Company (owned by the Great Northern Railway Company), Amalgamated Copper (later the Anaconda Copper Mining Company), and the J. Neils Company were the largest of the early lumber manufacturers in the area.

Forest Reserves, the predecessors of National Forests, were first established in Western Montana in the 1890's in response to a growing concern over the diminishing National timber supply. Glacier National Park was established in 1910.

The abundance of suitable grazing habitat was due, in part, to the large forest fires which swept through the Area in the late 1800's and early 1900's. Grazing was an important use of public land from the early part of the Twentieth Century until the 1940's. Many bands of sheep grazed the mountains of Western Montana during this period until increasingly effective fire control efforts reduced the amount of acreage burned annually, and transitory ranges reforested themselves.

Following World War II, the Nation's housing boom began and Western Montana became a large exporter of forest products. With the cheap power afforded by Hungry Horse Dam, aluminum reduction became an important industry in the late 1950's.

LIFESTYLES IN WESTERN MONTANA

6.4 LIFESTYLES IN WESTERN MONTANA

This section of the Guide explores the differences among communities in Western Montana. Using the five National Forests within the Planning Area and the Flathead Indian Reservation as basic geographical divisions, lifestyle areas are identified and discussed. Much of the following information is a summary of "Lifestyles of Western Montana: A Comparative Study." 1/

The lifestyle of an area consists of an integrated set of factors, including how people in the area earn a living, how long they have lived in the area, how they spend their leisure time, what they think and do about economic development and resource utilization, and how they appear to view their community in relation to the outside world. Together these make up a pattern of living that distinguishes people of one community or group of communities from people in others. In what follows, the patterns of living for communities within or adjacent to the National Forests and the Indian reservation in Western Montana are identified. Following the descriptive section is an evaluation of probable reactions to resource management programs for the National Forests in each lifestyle area.

A. Bitterroot National Forest Area: The several communities of the Bitterroot Valley are closely linked with one another by highway and are sufficiently alike to be considered a single lifestyle area. There is no "typical resident" who represents this lifestyle area. In fact, if there is one distinguishing feature of the Bitterroot lifestyle, it is its tendency toward heterogeneity in all walks of life. Valley residents have very different ways of making a living, attitudes toward political issues, and methods of spending their leisure time. Discussion of social and cultural features of the area must take these differences into account.

The Bitterroot Valley differs from other portions of Western Montana in that its economic well-being is largely dependent on agriculture. The agricultural base of the valley economy is changing, however, under the impact of immigrant population pressures from Missoula and outside the State. What was formerly an area of small farms and ranches tenented by long-term residents has been increasingly subdivided. A considerable amount of privately-owned rural acreage is now in the hands of persons who live on the land but who do not rely entirely on agricultural income for their subsistence.

The proximity of Missoula has accelerated the rate of subdivision in the valley and has intensified the sharp rural-urban contrast between the two places. Unlike other portions of the Planning Area, the Bitterroot has a single urban focus; its residents have no easy access to a city other than Missoula. The rural lifestyle of the Bitterroot has therefore had to accommodate itself to one of Montana's rapidly growing cities, and one with an unusually youthful and mobile population.

1/ Prepared for the Forest Service, Northern Region, by Dr. Lee Drummond, Deparement of Anthropology, University of Montana, Missoula, Montana, 1975.

Increasing immigration has meant increasing economic, political and valuational diversity. On the economic-vocational level, there appear to be three distinct groups:

1. Established ranching and farming families who have held onto their land.

2. Professional and white collar employees of the Forestry Sciences Laboratory and Forest Service, along with middle income commuters to Missoula.

3. Retired persons, including many who have moved from urban areas to escape crime and pollution.

These population segments apparently form the bases of local interest groups, which can become highly factionalized.

Values associated with resource use and land management in the Bitterroot are correspondingly polarized: the material prosperity that accompanies economic development (in this case, subdivisions) is desirable to many; others want to avoid the consequences of development (more people and urban-oriented behavior patterns). Residents' feelings about government land management plans (whether county, state, or Federal creations) are sharpened by the realization that the value of their land is steadily increasing. Higher property values bring greater anxiety over private versus public determination of land use policies.

The Bitterroot lifestyle area is a classic example of the influence ideology and values can have on people's reactions to resource management programs; the land and its products are not simply physical items for valley residents, but rather are symbols of community and individual identity.

B. Lolo National Forest Area: Lolo National Forest covers a large part of Western Montana and the numerous communities within or adjacent to it contain a high percentage of the Area's population. It is an area of considerable geographical and social variation, and at least three lifestyle areas may be distinguished within its borders.

One of the three areas is Missoula and suburbs. This lifestyle area has Region-wide influence; however, because of its proximity to Lolo National Forest lands, the Missoula area is included in this section of the report.

The second lifestyle area is the communities along Interstate 90--including Superior, Alberton, St. Regis, DeBorgia, Saltese, and Haugen. Superior is the local hub of this lifestyle area.

A third lifestyle area is the diverse group of logging and ranching communities around Thompson Falls and Plains. Plains is the hub of the ranching communities to the north (Camas, Camas Prairie, Lonepine, Niarada, and, marginally, Dixon). Thompson Falls is the social center for the logging communities of Heron, Noxon, Trout Creek, White Pine, Belknap, and Paradise. A brief account of each lifestyle area is provided below.

1. Missoula: The Missoula community is unique in Western Montana because it is an urban center with a large population of youth and professionally-trained people, many of whom moved to the area from other parts of Montana or the United States. Its residents possess an urban outlook that contrasts rather sharply with outlooks in other Western Montana communities.

The city's residents are accustomed to open, sometimes heated public debate over political, economic, and environmental issues. Moreover, an appreciable number are organized into effective interest groups, including several unions, businessmen's organizations, political parties, and environmental groups. These groups are usually prepared to back their particular interests in the political arena, so that public controversy is not only common but has important consequences. Proposals to alter existing resource management almost inevitably collide with the desires of some interest groups, with public criticism resulting.

A rapidly growing population and an uncertain wood products economy are probably the two major factors contributing to the changeable nature of the Missoula lifestyle. The allure of city life (especially a city in a scenic locale and a city that lacks serious urban ills) attracts immigrants who are not always guaranteed a steady job when they arrive. Expensive housing and sporadic incomes create uncertainty for many residents and give the Missoula lifestyle an air of urban uprootedness and aggressiveness--especially in comparison to rural, agriculturally-oriented communities in the Planning Area.

2. Superior: The community of Superior and towns to the east and west along Interstate 90 share a common lifestyle oriented toward construction and the timber industry. Present economic development in the area contrasts with the situation there 25 years ago, when most local residents were dependent on seasonal logging for their livelihood. At that time, the Superior population consisted largely of low-income transient families, with a small core of established families.

The introduction of a match factory and, more recently, interstate highway construction projects, have created a more stable working class. As a result, political power has diffused throughout this population. There is

still a sizeable transient population in the area, and housing is generally in short supply. Although the town of Superior has not appreciably increased in size over the past ten years, a subdivision housing some 300 persons has grown up near the mill and made it a busier place than it was formerly.

The presence of the interstate highway gives these communities a kind of "corridor lifestyle," in which residents are oriented toward Missoula to the east and Wallace-Mullan, Idaho to the west. Accessibility to nearby shopping and recreation areas has made the home communities more way-stations than self-contained social units.

Most land around these communities is publicly-owned, and residents link public ownership to the high mill levys on property. Thus, while the Forest Service contributes to the local economy, it is regarded ambivalently by property-owners, who often believe they are picking up a tab that is rightfully the government's. The [illegible] of the local economy [illegible] is sensitive to changes in the timber industry [illegible]. At the same time, the tradition of a transient logging population in the area gives these communities a resiliency to changing economic conditions; layoffs and slack periods are part of the timber worker's life, and this fact is incorporated into individual's expectations and values.

c.3. Thompson Falls-Plains: Thompson Falls and communities situated nearby along the Clark Fork River resemble the Superior area in their orientation to the wood products industry. However, the Thompson Falls area has a distinctive pattern of living, for, unlike the Superior area, its communities do not have easy access to a large town or urban center. The narrow valley and its winding road bestow a certain insularity and self-sufficiency on the Thompson Falls communities. Residents of these communities are accustomed to large-scale logging operations and regard this activity as a proper use of the environment. Thus the forests are primarily of economic rather than recreational significance to residents of the Thompson Falls lifestyle area.

Plains and the communities to the north differ from those of the Clark Fork River valley in their orientation to ranching. Some settlements in the Plains area are even more isolated than those in the Thompson Falls area. The ranching way of life contributes to an insular self-sufficiency among Plains area residents, who are accustomed to gaining a livelihood from working their own land. Values associated with land use are also affected by recreational attractions, such as local hot springs and the area's proximity to Flathead Lake.

C. F. The Flathead National Forest Area:

Populations in the Flathead National Forest area are centered around Columbia Falls, Kalispell, and Whitefish. Many smaller outlying communities are closely tied to these three commercial and occupational centers. While each community has its distinctive attributes, there is a high degree of interdependence. Thus, the upper Flathead Valley was considered one lifestyle area.

Columbia Falls advertises itself as "the industrial hub of the Flathead." Kalispell, the largest population center and the Flathead County seat, emphasizes its commercial services and identifies strongly with the agricultural emphasis of the central valley. Whitefish promotes its recreational resources and leisure attractions. Lifestyles of the three communities have much in common. Many residents of Kalispell and Whitefish commute daily to work in the lumber, plywood, and particle board mills or the aluminum smelter in Columbia Falls. Business and government-related occupations support much of the Kalispell area population. Whitefish residents consider the railroad the economic backbone of their community.

Entertainment and leisure activites draw valley residents principally to Kalispell and Whitefish, where much community energy is focused on the development of year-round recreational attractions for residents and tourists. Social and voluntary organizations frequently include members from all three communities.

While the majority of area residents have been living in the Flathead for many years, recent industrial expansion coupled with an interest in western Montana by retirees from other states, have brought steady growth to the area. Concern is expressed for this trend, especially in Kalispell where the movement of "outsiders" and "newcomers" into the community has led to concerns about subdivision and the loss of agricultural lands. Although Whitefish and Columbia Falls are both experiencing growth and keeping a cautious eye on growth-related problems, there is less concern for these problems here than in Kalispell.

Most residents of the Flathead Valley generally consider themselves relatively secure economically and believe their communities are sufficiently prosperous. There is little interest in attracting further economic development, although many Columbia Falls residents would like to improve and possibly expand existing industries to make their community less vulnerable to regional and national economic trends. Many Whitefish residents would like the tax relief that a major development would bring, but are quick to caution that only "clean" industries would be considered. Kalispell residents are generally too concerned about the unwanted costs of development (crowding, population growth) to solicit expansion.

While Columbia Falls and Kalispell residents see their lives and communities as highly dependent upon the outside world and subject to the economic and political circumstances of the State and Nation, Whitefish residents exhibit confidence and pride in their community's independence. Whitefish residents have experienced little impact from the recent recession and are confident that their recreation and railroad-centered economy is stable; merchants are renovating the business district to keep local trade from going to Kalispell. There is a great deal of community interest in service organizations and social affairs.

Valley residents seem to be very intersted in the environment and land use-related problems. Much year-round interest is focused on tourism and the scenic attractions that bring more than a million visitors through the area each year. Area-wide concern over recent proposals to mine coal in the Flathead drainage in Canada demonstrates an increasing tendency to weigh developments against environmental and resource impacts.

In Columbia Falls, concern over pollution and resource management is stimulated both by the desire to maintain the tourist economy and by the desire to ensure long-range stability for industrial firms that support the town. Whitefish residents are more concerned with preserving the recreational and aesthetic surroundings which they believe to be the main reasons for living in their community. Residents of the Flathead Valley demonstrate high concern for recreational activities and interst in the beauty of the natural environment. For Columbia Falls, especially, and for Kalispell, this appreciation of natural surroundings indicates an ongoing struggle with contradictory desires for natural amenities and development of nearby resources. In Whitefish, where industrial activity is less important to the economy, the contradiction is less evident.

The Kootenai National Forest Area

The two main population centers near the Kootenai National Forest are Libby and Eureka. Although their lifestyles are quite similar, residents of these communities are not closely tied with one another socially or economically. The smaller community of Eureka is almost as closely linked with towns in the Flathead Valley as with Libby.

Both communities are emerging from an era of economic boom and rapid, but temporary, population growth which accompanied construction of Libby Dam. Eureka, which prospered from highway and railroad construction related to the dam project, has almost completely returned to the lumber- and agricultural-oriented community it was before construction of Libby Dam. Libby, where the dam was constructed, has seen a more gradual decline in the size of its work force.

Eureka residents take considerable interest in the local social life and school activities. Concern for economic security and community propserity

is present, but the stabilizing of the "boom" population has not presented severe hardships. Nationwide declines in demands for lumber have forced one local mill out of operation, and residents are interested in attracting some alternative form of small, but clean, industry to provide employment for young job-seekers who prefer to stay in the area.

Libby residents see forest industries and the traditional backbone of their community, with mining second in importance. They are generally confident that, with the end of dam construction, the timber industry will continue to support their area, but there is some concern for competition from lumber mills in Sanders or Flathead Counties. Residents of Libby exhibit considerable concern for land use and legal affairs. Interest in local social activities is also high, reflecting the community's isolation from entertainment and recreational sources in other communities. Residents consider themselves prosperous and comfortable at present, with few recession-related problems. They are not opposed to additional growth, although the prospect seems unlikely to them at present.

Libby and Eureka are capturing a share of the seasonal tourist travel between Glacier Park and Spokane. Promotional organizations advertise the Koocanusa route and considerable time and effort is being channeled into promoting the development of recreational facilities around the new reservoir.

Residents of both these communities have appreciation for the natural environment; at the same time, the economic importance of timber harvest is a stark reality--without it neither community could maintain its present economic level. Land subdivision is occurring, but is not a major concern either in the agriculturally-oriented Tobacco Valley or in the rugged terrain around Libby.

Both communities recognize their relative isolation from Montana's political and commercial centers and exhibit considerable interest in State and Federal political issues. Residents perceive themselves almost entirely dependent on resources from public lands. Many have an unsettled feeling that nobody really knows they are there; thus, they are apprehensive of policy-makers in faraway places. Libby Dam, for example, was built over the objections of many local residents, and the anxiety persists that local wishes will not be taken into account in future decisions that will affect the area lifestyle.

Life within the Kootenai lifestyle area is based on the pragmatic assumption that nature is to be intelligently, but actively used--not passively contemplated. However, conflict is arising around this premise. A recent announcement of a feasibility study for another dam project at Kootenai Falls has met with vocal opposition from the Libby area.

Residents of the northern part of this lifestyle area seem less apprehensive about change than residents of the southern portion. This difference reflects the diversity of lifestyles in the Eureka and Tobacco Valley areas. Livestock production accounts for a sizeable portion of local incomes in Tobacco Valley communities and there is interest in mineral exploration. There is no real controversy about industrial development and its effects on the farming and grazing potentials of the area. Isolation seems to be viewed more as a benefit than a frustration by people in the northern part of the Kootenai National Forest area, and with prospects of change less immediate, most residents do not feel their lifestyle is determined by outside forces.

E. Deerlodge National Forest Area

Philipsburg is the major community near that portion of Deerlodge National Forest within the Western Montana Planning Area. Philipsburg is primarily a farming and ranching community. Its social life centers around churches, schools, and voluntary organizations. Philipsburg area residents show more interest in local issues than in State and National events. The main "environment" is the "social environment." The principal economic concern of residents is farming or ranching, and land use values are oriented around this lifestyle. The community does not appear to be facing major controversies about land use or political control and attention is not focused on planning or development.

An interesting characteristic of the Philipsburg community is its emphasis on youth. Senior citizens make up the major part of the community population, and older residents entertain hopes for Philipsburg youth. Educational interests are very high and involvement in school activities seems to provide a sense of personal identity and community belonging.

F. Flathead Indian Reservation Area

The three major communities in this lifestyle area are St. Ignatius, Polson, and Ronan. St. Ignatius and the surrounding ranching and farming communities focus much interest on pleasurable social affairs and service projects. Schools are major socializing environments and prominent features of community life. Local concerns outweigh concern for events that occur outside the St. Ignatius area. Residents value the "Old West" heritage, as indicated by social activities such as picnic socials and covered wagon caravans. Construction and grazing are important public topics, and many residents favor management that perpetuates existing land use practices.

The residents of Polson, on the other hand, are quite involved in commerce and focus their interests on topics such as tourism and town zoning. Polson residents enjoy the economic benefits of tourism. Their concern with property values denotes an individualistic approach to the questions about

resource use and colors their attitudes toward the issues of development, subdivisions, and pollution. Residents appear to value social stability, but there is some local conflict about population growth and subdivision. Year-long residents, summer residents, and tourists contribute to the economic base. With year-long residents, a Native American population, summer residents, and tourists, the Polson area is diverse.

Ronan's population is even more ethnically diverse; it is comprised of Native Americans and white ranchers and farmers. Ronan and nearby communities form a lifestyle area in which land planning and management are promoted in an atmosphere full of potential conflicts--not only over private interests but over basic questions of jurisdiction and administrative authority as well. Ronan businessmen are interested in local commercial growth; there is a desire to build up a business community independent of Polson.

Although the three communities of St. Ignatius, Polson, and Ronan are mainly oriented to the "social environment," in Polson and Ronan this orientation has important economic and political ramifications. Chief among these are potential conflicts of interest over land use, access, water rights, and Native American tax obligations and land rights.

Concerns for population growth exist because of the underlying problem of understanding diverse claims and values of taxpayers, businessmen, ranchers, farmers, and Native Americans. The changing legal and economic status of Native Americans in recent years has begun to impress Polson and Ronan residents with the inevitability of certain changes in their traditional lifestyle. They are apparently waiting to see the nature and degree of these changes.

G.

R. Anticipated Reactions to Resource Management Programs

1. Bitterroot National Forest

a. In the face of the highly charged valuational environment in the Bitterroot Valley, government planners at every level must expect their efforts to be criticized and be prepared to defend them in a way that is responsive to local sentiment as well as to the material facts.

b. Increasing government controls on private land use activities may well antagonize local residents who strongly favor free enterprise, while relaxing controls may provoke criticism by interest groups favoring environmental safeguards.

2. Lolo National Forest

a. In the Missoula lifestyle area, any proposal to alter existing resource management will meet with criticism from some of the many interest groups.

b. In the Superior lifestyle area, any resource management plan which proposes to significantly curtail timber harvest will meet with public criticism. At the same time, the tradition of transient logging populations will give the area a resiliency to changing economic conditions.

c. The practical, economy-oriented attitudes of Thompson Falls-Plains lifestyle area residents are expressed in the local political oragnization and may be expected to affect community reactions to resource use proposals.

d. People in the Plains lifestyle area primarily view the land as a source of enjoyment--the pleasure of owning and working it, of hunting and fishing on it, and of relaxing on it. This attitude will affect residents' acceptance or rejection of resource management plans. Plans that, in the opinion of local residents, threatens to erode their control over land use may be expected to meet opposition.

3. The Flathead National Forest

a. Indications are that resource development to meet existing needs (lumber, hydropower) would be supported in the Flathead area but that additional resource development would not be welcome.

b. Flathead Valley residents are very aware of, and concerned about social change; responses to change are increasingly conservative. Residents are accustomed to new issues and can be expected to actively seek participation in making decisions about actions that would alter their environment or ways of life.

c. The emphasis placed upon the environment (as an attration for tourism and as an aesthetic benefit) suggests there may be strong opposition to timber harvest or alteration of the land in areas visible from roads or townsites. Reforestation programs would probably have strong local support.

d. Ongoing controversy over mineral-related pollution could become more volatile if, for example, minerals exploration and/or production or oil leasing became realities in this area.

e. Alterations in the allowable timber cut would directly affect lifestyles in Columbia Falls because lumber operations are crucial to ~~company~~ community well-being and there are presently few alternative occupations.

f. A reduction in timber harvest would also have a significant but less consequential compact on Kalispell due in part to its reliance on business with Columbia Falls residents. Whitefish would be affected, but to a lesser degree due to minor employment in wood products.

g. The population growth that any significant development in the valley would bring to Kalispell would be likely to provoke negative response.

h. Whitefish residents may be expected to oppose any major innovations that would not conform to or promote the image of a recreational center.

4. Kootenai National Forest

a. Although satisfaction with a close-knit, socially-focused community life now seems to be the prevailing sentiment in the Libby area, ~~agency~~ Forest Service personnel can expect any major land use decision to invite a coordinated public response.

b. Alteration in allowable timber cuts could be expected to bring almost unamimous response, since a change would affect virtually everyone in Libby, along with many Eureka residents.

c. Because its economy is dependent upon more than one resource use, residents of the Libby area would probably express a more diversified response to land allocation and management problems; methods of weighing local sentiments will need to be developed.

d. Realizing that regional energy problems are likely to focus attention on their area, Lincoln County residents may increase organized opposition to plans that would use nearby resources but offer little in return to the local population.

5. Deerlodge National Forest

a. As ranchers and farmers, Philipsburg residents have intimate ties with the land and their interest in land management is primarily agricultural. Resource management programs should address agricultural concerns.

6. Flathead Indian Reservation

a. Within this area, concerns for employment opportunity and moneymaking would most likely arise in Polson and Ronan, since residents appear to feel that business development would be highly favorable to their communities.

SOCIAL AND ECONOMIC SYSTEMS

A.

1. Characteristics of the Population

x1. Population Growth: Between 1950 and 1960, Western Montana's population grew 12.3 percent (from 114,454 to 128,541 persons). By 1970, Area population had grown to 157,428--a 22.5 percent increase (see table 2). Population growth in Western Montana was 1.9 percent less than State growth between 1950 and 1960, but 19.6 percent greater between 1960 and 1970. Thus, during this 20-year time span, the 37.6 percent overall growth rate in the Planning Area was almost double the 17.5 percent Statewide overall growth rate.

Population in the Planning Area is concentrated in Missoula, Flathead, and Lincoln Counties. In 1970, these counties accounted for almost 74 percent of the Area's population. Missoula County has the highest percent of total Area population. Flathead County has the second largest percentage of the population in the Area, but its population has grown at a lesser rate than Missoula County. Lincoln County's percentage of the Planning Area's total population has increased markedly since 1950, but appears to have leveled off since the year Libby Dam was completed. Ravalli County has shown an increase in population that is expected to continue in the late 1970's; growth there seems to be related to population growth in Missoula County. Lake, Mineral, and Sanders Counties showed stable population increases between 1950 and 1973, especially since 1970. Granite County is the only county in Western Montana where population decreased between 1950 and 1973.

x2. Population Density: Population density in Western Montana has been increasing at a faster rate than it has been in Montana (see table 3). Between 1950 and 1972, population density in the State increased .8 person per square mile, while population density in the Planning Area increased 2.5 person per square mile. Within the Area, Missoula county had by far the greatest density in 1970, with 22.3 persons per square mile. Lake and Flathead showed the next greatest densities with 9.7 and 7.7 persons per mile, respectively.

x3. Racial Composition: Montana has a large Native American population. At the time of the 1970 census, there were 27,130 Native Americans in Montana--Native Americans comprised 3.9 percent of the total State population (see table 4). Other racial minorities accounted for only 0.6 percent of the State's population.

In Western Montana, 2.5 percent of the popoulation (3,957 persons) is Native American; 3,570 Native Americans in the Area live in Lake, Missoula, Flathead, and Sanders counties, which are either on or adjacent to the Flathead Indian Reservation. Considering all counties in Western Montana, Lake has by far the largest Native American population--15.2 percent of the county's population is Native American.

Table 2

POPULATION AND PERCENT CHANGE
MONTANA AND WESTERN MONTANA PLANNING AREA (1950-1970)

	Population					
	Persons			Percent Change		
	1950	1960	1970	1950-1960	1960-1970	1950-1970
Planning Area	114,454	128,541	157,428	12.3	22.5	37.6
Montana	591,024	674,767	694,409	14.2	2.9	17.5

(1950-1960) U.S. Bureau of the Census, Current Population Reports, Components of Population Change, 1950 to 1960, for counties, S.M.S.A.S., State Economic Areas and Economic Subregions, Series p. 23, No. 7, Washington, D.C., U.S. Government Printing Office, 1962, table 7.

(1960-1970) U.S. Bureau of the Census, 1970 Census of Population and Housing, General Demographic Trends for Metropolitan Areas, 1960 to 1970, Final Report, Montana PHC(2)-28, Washington D.C., U.S. Government Printing Office, 1971, table 2.

1/ Percent of 1950 population.

2/ Percent of 1960 population.

Table 3

POPULATION DENSITY; MONTANA AND WESTERN MONTANA PLANNING AREA (1950-1970)

The table below presents population densities for Planning Area 2--1950, 1960, 1970, and projected 1972. (Persons per square mile).

	1950 1/	1960 1/	1970 1/	1972 2/	Change 50-72	Rank (1970)
State	4.1	4.6	4.8	4.9	.8	
Western Montana Planning Area	5.4	6.1	7.5	7.9	2.5	
Flathead	6.1	6.4	7.7	8.1	2.0	3
Granite	1.6	1.7	1.6	1.5	-.1	8
Lake	9.2	8.8	9.7	10.6	1.4	2
Lincoln	2.3	3.4	4.9	4.8	2.5	5
Mineral	1.7	2.5	2.4	2.6	.9	7
Missoula	13.6	17.1	22.3	23.4	9.8	1
Ravalli	5.5	5.2	6.0	6.8	1.3	4
Sanders	2.5	2.5	2.6	2.7	.2	6

1/ U.S. Bureau of the Census.
2/ Montana Vital Statistics: 1972; Bureau of Records and Statistics, table 2, p. 10.

Table 4

1970 POPULATION BY RACE*
MONTANA AND WESTERN MONTANA PLANNING AREA

	All Races	Native American		Other Minority	
	No.	No.	Pct.	No.	Pct.
Montana	694,409	27,130	3.9	4,281	0.6
Planning Area 2	157,428	3,957	2.5	666	0.4
Percent of State	22.7	14.6		15.6	
Counties					
Flathead	39,460	327	0.8	147	0.4
Granite	2,737	20	0.7	1	0.03
Lake	14,445	2,199	15.2	44	0.3
Lincoln	18,063	209	1.2	39	0.2
Mineral	2,958	16	0.5	6	0.2
Missoula	58,263	660	1.1	282	0.5
Ravalli	14,409	142	1.0	135	0.9
Sanders	7,093	384	5.4	12	0.2

*Profile of the Montana Native American p. 27, table A-7

4. Net Migration: Net migration indicates the difference between the number of people moving into an area and those moving out of the area over time (or the difference between births and deaths). Between 1950 and 1960, there was a net outmigration of 4,566 persons from Western Montana--a 4 percent rate of loss (see table 5). This was only slightly less than Montana's 4.3 percent net outmigration rate. From 1960 to 1970, there was a net inmigration to the Planning Area (10.9 percent, or 13,962 persons), while net outmigration from the State continued (-8.6 percent, or -58,153 persons). Missoula, Flathead, and Lincoln counties, the largest counties in the Planning Area, accounted for most of the inmigration during the 1960's.

Data from the 1960 and 1970 Census of Population indicate that Western Montana has attracted only a slightly larger proportion of newcomers than the State. There appears to have been no significant increase in the proportion of newcomers to the Planning Area between 1950 and 1970; this suggests that the shift from net out- to inmigration resulted from fewer people leaving the Area in the 1960's than in the 1950's.

B. Characteristics of the Economy

1. Structure of the Economy: Economies may be divided into basic and derivative sectors. Basic industries are those which depend heavily on markets outside an area or are otherwise influenced by factors originating beyond its borders. The major basic industries in Western Montana are wood products, agriculture, and the Federal Government. Derivative industries primarily serve local populations. In Western Montana, wholesale and retail trade, services, and local government are the derivate sectors.

Economists believe that most economic growth in relatively small areas, such as Western Montana, can be attributed to events outside the Planning Area and that changes in derivative industries can be traced to changes in basic industries. Western Montana's major basic industries will be examined because they are important in determining overall economic change within the Area.

The importance of individual basic industries to the local economy can be measured by their share of total earnings and employment in the basic sector. Earnings are probably the best index of an industry's contribution to the local economic base because employment includes those who work only part time and double counts those holding more than one job.

Table 6 shows employment and earnings for the basic industries in Western Montana during 1968 and 1972. Agriculture, wood products, and the Federal Government are listed separately. The "all other" category includes railroad, mining, primary metal refining, and certain other relatively small manufacturing industries. The tourist industry could not be included in the economic base because of a lack of data.

Table 5

NET MIGRATION AND MIGRATION RATE;
MONTANA AND WESTERN MONTANA PLANNING AREA (1950-1970)

	Net Migration			
	Persons		Migration Rate	
	1950-1960	1960-1970	1950-1960 1/	1960-1970 2/
Planning Area 2	-4,566	13,962	-4.0	10.9
Montana	-25,206	-58,153	-4.3	-8.6

(1950-1960) U.S. Bureau of the Census, Current Population Reports, Components of Population Change, 1950 to 1960, for counties, S.M.S.A.S., State Economic Areas and Economic Subregions, Series p. 23, No. 7, Washington, D.C., U.S. Government Printing Office, 1962, table 7.

(1960-1970) U.S. Bureau of the Census, 1970 Census of Population and Housing, General Demographic Trends for Metropolitan Areas, 1960 to 1970, Final Report, Montana PHC(2)-28, Washington D.C., U.S. Government Printing Office, 1971, table 2.

Table 6

BASIC AND DERIVATIVE EMPLOYMENT AND EARNINGS;
WESTERN MONTANA PLANNING AREA
1968 and 1972

	1968				1972			
	Earnings		Employment		Earnings		Employment	
	Thous. of Current $	Percent of Total	Number	Percent of Total	Thous. of Current $	Percent of Total	Number	Percent of Total
Economic Base TOTAL	163,745	100.0	23,421	100.0	201,251	100.0	22,008	
Agriculture	15,775	9.6	5,420	23.1	20,450	10.2	5,121	23.3
Wood Products	61,967	37.9	8,453	36.1	74,312	36.9	8,054	36.6
Federal Gov.	28,211	17.2	3,344	14.3	40,077	19.9	3,236	14.7
All Other Base Industries	57,792	35.3	6,204	26.5	66,412	33.0	5,597	25.4
TOTAL, Derivative Industries	170,299	100.0	34,710	100.0	245,153	100.0	41,207	100.0
TOTAL, All Industries	334,044	100.0	58,131	200.0	446,404	100.0	63,215	100.0

Source: Montana Department of Intergovernmental Relations, Research and Information Systems Division, Derived from U.S. Bureau of Economic Analysis, Regional Economic Information System, Unpublished Data, 1974.

a. Wood Products:

The data in table . show that wood products is the most important basic industry in the Planning Area. It accounted for 36.9 to 37.9 percent of total basic earning and 36.1 to 36.6 percent of total basic employment in 1968 and 1972, respectively. By themselves, the figures for those 2 years are not sufficient to establish a long-run trend. Other information, however, suggests that the wood products industry has represented 35 to 40 percent of the economic base since the early 1960's.

The wood products industry in Western Montana is heavily dependent on timber from National Forests. In the past, over one-half of the Montana timber harvest was from National Forest land. However, this proportion has been declining since 1965. At present, there is not sufficient data to determine if this decline is a long-run trend or simply a cyclical vacillation. There is some evidence that harvest from private timber land increases in response to declining harvests from Federal land.

Most of the timber harvested from the Bitterroot, Flathead, Kootenai, and Lolo National Forests is processed in the Planning Area. Between 1969 and 1971, less than 10 percent of the harvest from these Forests was sent outside the Planning Area for processing.

b. Federal Government:

The Federal Government, which includes the U.S. Forest Service, is the second largest basic industry in Western Montana. During 1968, it accounted for 17.2 percent of total basic earnings and 14.3 percent of total basic employment. In 1972, these figures had risen to 19.9 and 14.7 percent, respectively. When measured in terms of earnings, the relative importance of the Federal Government increased during the 1960's and early 1970's. Much of this increase may have been caused by the above-average rate of growth in wages and salaries of Federal employees.

Federal employment in the Planning Area consists, for the most part, of relatively well-paying and stable positions. During 1972, the average Federal employee earned about $12,400 compared to the average $8,400 wage for all nonfarm and salary workers. Most Federal positions are year round.

c. Agriculture:

Agriculture has mixed importance in Western Montana. When jobs are used as a measure of its importance, agriculture represented 23.1 and 23.3 percent of the Area's basic sector in 1968 and 1972, respectively. However, agriculture accounted for only 9.6 and 10.2 percent of total earnings in these years. The differences between these figures can be attributed to several factors: 1) agriculture in Western Montana is relatively unprofitable, and 2) for many, farming and ranching is only a part-time occupation. In general, the farms and ranches in the Planning Area may be characterized as relatively small, and as specializing in livestock production. Agriculture's share of total basic earnings has been declining during recent decades. The minor increase in its relative importance between 1968 and 1972 was probably caused by the recent rise in farm prices.

National Forest land is important to agriculture in Western Montana in several ways. Of primary importance are National Forest rangeland and water for irrigation. Exact data on grazing are not available, but the 44.5 thousand a.u.m. capacity of National Forest range appears to be less than 10 percent of all range and pastureland in the Planning Area. There is also a lack of adequate data for irrigated land; however, it is known that about 80 percent of land in hay production (hay is a necessary input for livestock production), and about 60 percent of private cropland and permanent pastureland are irrigated.

2. Per Capita Personal Income: There is no truly accurate measure of economic well-being. The most widely used indicator is money income. The major shortcoming of using money income as an index is that it includes only monetary values; residents of Western Montana certainly enjoy many benefits which cannot be measured in dollars. Nevertheless, money income is one measure which is readily available and widely understood.

Table 7 shows 1950, 1959, and 1970 per capita personal income for Western Montana and Montana. Per capital personal income is aggregate money income divided by population. The figures in this table show that per capita income in the Planning Area grew from $1,370 in 1950 to $3,023 in 1970--an increase of over 220 percent. Much of this increase was due to inflation; however, residents of this Area were generally "better off" in 1970 than in 1950.

Despite these increases, per capita income in the Area has consistently lagged behind per capita income in Montana and the United States. The data in table shows that, between 1950 and 1970, the Area's per capita income fell from 81.1 to 76.2 percent of the National average. Also, during this period, Area per capita income averaged several hundred dollars below the State average. This suggests that Western Montana residents have not reaped the benefits of economic growth to the same degree as have people elsewhere in the State and the Nation.

Per capita income in the Planning Area has lagged behind the State and Nation for a number of complex reasons. Among them are:

a. The Planning Area has had a lower proportion of its population in the work force than has Montana or the United States. Thus, in the Area, a given amount of earnings have been divded among more people.

b. There have been higher unemployment rates in Western Montana than in the State or the Nation.

c. In Western Montana, there has been lower pay for jobs equivalent to higher-paying jobs in other parts of Montana or the Nation. The average earnings per worker in the Planning Area have been below earnings for similar industries in Montana and the United States. This has been especially true with agriculture.

Table 7

PER CAPITA PERSONAL INCOME;
MONTANA AND WESTERN MONTANA PLANNING AREA
(In Current Dollars)

	1950	1959	1970
Planning Area 2	1,370	1,870	3,023
Percent of U.S.	81.1	86.3	76.2
Montana	1,622	2,004	3,504
Percent of U.S.	108.4	92.5	88.4

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economics Information System, Washington D.C., Unpublished Notes, 1974.

d. A

4. When compared to Nationwide averages, Western Montana has had a greater than proportionate share of its employment in industries which, in general, pay low wages.

3.X. Money to Live On: The number of people who live on a poverty-level income (or an income 125 percent of poverty level) is a primary social and economic concern. Income levels can be used to evaluate several concerns, such as income distribution and the degree of concentration of poverty.

In 1970, the United States, Montana, and the Planning Area all had around 15 percent of ~~their populations~~ families living at less than 125 percent of poverty-level income. Within the Planning Area, the percentage of ~~populations~~ families living at this income level varies greatly from county to county (see table 8). In Lake County, 26.2 percent of families were living on less than 125 percent of poverty-level income, while only 9.8 percent of families in Lincoln County were at this income level.

Another dimension of the poverty problem becomes apparent when the percentage of male and female-headed households living on poverty-level incomes is compared. A much higher percentage of female-headed households in the Planning Area were living under 125 percent of poverty-level income in 1970 (see table 9). While more female-headed households in the State lived on less than 125 percent of poverty-level income, the degree of poverty among female-headed households was more severe in the Planning Area. Mineral, Lake, and Ravalli Counties greatly exceed both the State and Planning Area averages in this respect.

The bulk of the wealth within the Area was in Flathead, Lincoln, and Missoula Counties. In 1970, income levels in all counties in the Planning Area fell well below income levels in the United States as a whole; 46 percent of families in the Nation had an income 300 percent or more above the poverty level.

D. 4. Employment Opportunity: Another major social and economic concern is for the ability of any person who is able and willing to successfully secure work regardless of race, sex, or age. The major indicator used to examine employment opportunity is labor force participation, which is computed using the population 16 years or older.

In 1970, there were more unemployed females than unemployed males in the United States--5.1 and 3.9 percent, respectively (see table 10). In Montana, 6.8 percent of males and 6 percent of females were unemployed in 1970, while 9.0 percent of males and 8.3 percent of females in the Planning Area were unemployed.

(Table 8

DISTRIBUTION OF FAMILY INCOME;
UNITED STATES, MONTANA, AND WESTERN MONTANA PLANNING AREA (1969)

	Total Population	Percent of Poverty Level x Percent of Families						
		Under .50	.50-.74	.75-.99	1.00-1.24	1.25-1.49	1.50-1.99	2.00-2.99	.300+
United States	51,168,599	4.0	3.0 (7.0)	3.7 (10.7)	4.4 (15.1)	4.7 (19.8)	10.8 (30.6)	23.2 (53.8)	46.2 (100)
Montana	171,812	3.5	2.9 (6.40)	3.9 (10.3)	5.2 (15.5)	5.9 (21.4)	14.2 (35.6)	26.8 (62.4)	37.5 (99.9)
Planning Area 2	39,733	3.6	2.6 (6.2)	4.1 (10.3)	5.3 (15.6)	5.6 (21.2)	13.9 (35.1)	27.9 (63.0)	37.0 (100)
Counties									
Flathead	10,020	3.4	2.8 (6.2)	3.8 (10.0)	5.2 (15.2)	5.8 (21.0)	24.5 (35.5)	28.2 (63.7)	36.3 (100)
Granite	745	2.1	4.2 (6.3)	6.0 (12.3)	3.4 (15.7)	10.2 (25.9)	17.7 (43.6)	29.1 (72.7)	27.2 (99.9)
Lake	3,668	6.1	4.5 (10.6)	7.6 (18.2)	8.0 (26.2)	7.4 (33.6)	12.5 (46.1)	24.6 (70.7)	29.3 (100)
Lincoln	4,596	1.6	1.6 (3.2)	2.5 (5.7)	4.1 (9.8)	4.4 (14.2)	12.4 (26.6)	32.4 (59.0)	40.9 (99.9)
Mineral	789	5.3	1.4 (6.7)	1.1 (7.8)	6.0 (13.8)	5.1 (18.9)	16.9 (35.8)	32.8 (68.6)	31.4 (100)
Missoula	14,288	3.1	2.1 (5.2)	3.4 (8.6)	4.2 (12.8)	4.8 (17.6)	13.3 (30.9)	28.1 (59.0)	41.0 (100)
Ravalli	3,795	5.5	3.4 (8.9)	6.0 (14.9)	8.0 (22.9)	7.2 (30.1)	14.9 (45.0)	22.7 (67.7)	32.2 (99.9)
Sanders	1,832	4.5	1.9 (6.4)	4.4 (10.8)	6.9 (17.7)	5.9 (23.6)	16.5 (40.1)	28.0 (68.1)	31.9 (100)

Table 9

POVERTY LEVELS AND HEAD OF HOUSEHOLD*
MONTANA AND WESTERN MONTANA PLANNING AREA GUIDE (1970)

	Under 75% Poverty Level				Under 125% Poverty Level			
	Male Head		Female Head		Male Head		Female Head	
	No. of Households	% of Male Headed Households	No. of Households	% of Female Headed Households	No. of Households	% of Male Headed Households	No. of Households	% of Female Headed Households
Montana	7,376	4.7	3,669	27.3	20,584	13.1	6,116	45.5
PA #2	1,692	4.6	769	28.6	4,918	13.4	1,266	47.1
Counties								
Flathead	404	4.3	221	33.9	1,219	13.1	305	46.8
Granite	41	6.1	6	17.1	105	15.7	12	34.3
Lake	285	8.5	105	34.3	797	23.8	165	53.9
Lincoln	99	2.3	52	27.5	378	8.8	76	40.2
Mineral	27	3.9	20		78	11.1	31	64.6
Missoula	480	3.7	266	24.0	1,331	10.2	499	45.0
Ravalli	265	7.5	74	31.9	731	20.6	138	59.5
Sanders	91	5.3	25	21.2	279	16.2	40	37.3

*1970 U.S. Census Table 36 and ST4-P25, ST4-P26.

Table 10

LABOR FORCE PARTICIPATION*
UNITED STATES, MONTANA, AND WESTERN MONTANA; 1970

		Male Work Force			Percentage of Male Population in Work Force	Female Work Force			Percentage of Female Population in Work Force
	Total Work Force	Percentage of Work Force	Percentage of Employed	Percentage of Unemployed		Percentage of Work Force	Percentage of Employed	Percentage of Unemployed	
United States	80,051,046	61.9	96.1	3.9	76.6	38.1	94.9	5.1	41.4
Montana	260,589	64.9	94.0	6.0	79.2	35.1	93.2	6.8	39.9
Planning Area 2	57,690	66.1	91.0	9.0	71.5	33.9	91.7	8.3	36.4
Counties									
Flathead	13,613	67.5	90.0	10.0	71.7	32.5	90.5	9.5	33.2
Granite	999	74.7	95.2	4.8	71.2	25.3	94.1	5.9	26.7
Lake	4,821	64.5	92.5	7.5	64.4	35.5	95.3	4.7	34.3
Lincoln	6,197	72.5	88.8	11.2	74.7	27.5	89.0	11.0	30.3
Mineral	1,216	65.9	82.9	17.1	78.8	34.1	92.3	7.7	43.4
Missoula	23,103	62.8	92.2	7.8	71.7	37.2	91.8	8.2	42.2
Ravalli	5,261	68.0	92.2	7.8	72.2	32.0	91.8	8.2	32.6
Sanders	2,480	68.0	85.8	14.2	70.0	32.0	93.0	7.0	32.1

*U.S. Census, 1970, table 121, ST4-P59, ST4-P60

Unemployment varied from county to county within Western Montana. In Flathead, Lake, Lincoln, Mineral, and Sanders Counties, the male unemployment exceeded the female unemployment rate. In Granite, Missoula, and Ravalli Counties the opposite was true. The fact that there were higher percentages of unemployed males than females in the Planning Area and State, while there were higher percentages of unemployed females than males in the Nation can probably be attributed to the following situation: Many females who want to work have been unemployed for so long that they are no longer on the unemployment roll.

Although their numbers are increasing, there are fewer women than men in the work force. In Western Montana, 71.5 percent of males and 36.4 percent of females were in the work force in 1970. More than 40 percent of females in Missoula and Mineral Counties were in the work force. Granite County had the lowest percentage of its female population in the labor force--27 percent.

In the United States, there was also a disparate employment rate between Native Americans and the total work force in 1970. In Montana, the percent of unemployment among Native Americans was 18.7 percent, as compared with 6.2 percent unemployment for the work force as a whole (see table 11). In the Planning Area, the picture, although better, was still disparate; 10.5 percent of Native Americans were unemployed compared to 8.7 unemployment among the Area's total work force. Within Western Montana counties, Native American unemployment varied considerably. The highest unemployment rate was in Flathead County, where only 82 Native Americans (or .76 of the total Indian labor force) were listed as being employed. In Sanders, Ravalli, and Granite Counties, unemployment rates were less for Native Americans than for the total work force. However, there are less than 100 Native Americans in those three counties combined.

It is obvious that a disparate employment situation exists for both women and native Americans in the Planning Area. The number of women in the work force has been increasing, but women, as well as Native Americans, are still often unable to secure employment. Federal agencies are required to supervise their own hiring and employment practices so that access and opportunity for employment is as available to women and Native Americans as it is to men. Special labor programs, Federal contracts, and use agreements must also be monitored to insure compliance with equal employment opportunity provisions.

#5 Economic Growth: It is very difficult to measure the total output and overall performance of Western Montana's economy, because there are no gross National product estimates and no comparable output statistics for all sectors of the Area's economy. Consequently, total employment and/or participation income are often used as substitute indicators of economic growth. Neither of these are perfect, but together they usually provide a fairly accurate picture of growth or decline in a small economy.

Table 11

NATIVE AMERICAN LABOR FORCE PARTICIPATION*
UNITED STATES, MONTANA, AND WESTERN MONTANA; 1970

		Total Unemployed		Native American Labor Force				Total Indian Population	
	Total Work Force	Number of Persons	Percent of Total Work Force	No. of Persons on Labor Force	Percent of Total Work Force	No. of Persons Unemployed	Percent Unemployed	Number of Persons	Percent in Work Force
United States	80,051,046	3,497,447	4.3						
Montana	260,589	16,041	6.2	6,229	2.39	1,165	18.7	13,992	44.5
Planning Area 2	57,690	5,025	8.7	1,014	1.76	107	10.5	2,213	45.8
Counties									
Flathead	13,613	1,335	9.8	82	.76	21	25.6	173	47.4
Granite	949	51	5.1	4	.40	0	0.0	16	25.0
Lake	4,821	314	6.5	571	26.92	46	8.1	1,298	44.0
Lincoln	6,197	690	11.1	44	.71	5	11.4	117	37.6
Mineral	1,216	169	13.9	Population Count Less Than 25 Indians					
Missoula	23,103	1,755	7.6	220	.95	31	14.4	426	51.6
Ravalli	5,261	416	7.9	25	.48	0	0.0	43	58.1
Sanders	2,480	295	11.9	68	2.74	4	5.9	140	48.6

*Profile of the Montana Native American, p. 71, 1970 Census Table 53 MT.

Total employment may be interpreted as an index of the gross output in an area, measured by the number of persons required for production. According to this approach, the data in table 12 suggest Western Montana's economy is growing. Between 1950 and 1970, total employment rose from 39,359 to 53,855 persons--a 36.8 percent increase. Much of this growth occurred during the 1960's, when employment rose 27.1 percent, far exceeding the 7.6 percent increase of the previous decade. Western Montana's economy appears to have been especially prosperous when compared to Montana's economy during these 20 years. The Area's 36.8 overall employment growth stands in sharp contrast to the State's 13.6 percent growth.

Economic growth can also be measured by the civilian income earned from participation in current production. This "participation income" measures the gross output in terms of income payments to workers engaged in production. It excludes the distorting effects of large military installations. Dollar values are deflated by a price index to correct to the impact of inflation.

Table 13 shows 1950, 1959, and 1970 civilian participation incomes (in 1958 dollars) for the Planning Area and Montana. In Western Montana, real participation income grew from about $160 million to approximately $177 million between 1950 and 1959, and then rose to $268 million in 1970--an overall increase of 67.5 percent. The corresponding growth rate for Montana was 32.3 percent.

As mentioned earlier, total employment and real civilian participation income are only indirect measures of economy-wide output and production. However, they both portray the same trends for overall economic performance in Western Montana: The Area's economy has consistently grown faster than has Montana's, and the 1960's were, in general, more prosperous than the 1950's.

C. Projections

1. Projected Population and Employment: Projected population for Western Montana and Montana is presented in table 14. These figures show a slowly declining population for the Planning Area. In 1970, there were 157,428 residents; this population is projected to decline to 156,790 in 1980, rise slightly to 157,380 in 1985, and then resume the moderate decline reaching about 152,020 in 2020. Montana is also projected to experience a declining population. The largest decline in the State is projected to occur between 1970 and 1980, when it is anticipated the number of residents will decrease from 697,000 to 669,700. Thereafter, a moderate decline projected until 2020.

Total employment in the Planning Area is projected to increase from 53,855 in 1970 to 63,400 in 2020. The greatest growth is expected during the 1970's and the 1990's, with only slight increases anticipated in the following decades.

Table 12

TOTAL EMPLOYMENT, 14 YEARS OLD AND OLDER
MONTANA AND WESTERN MONTANA PLANNING AREA (1950-1970)

	Employment			Percent Change		
	1950	1960	1970	1950-59	1959-70	1950-70
Planning Area 2	39,359	42,367	53,855	7.6	27.1	36.8
Montana	218,460	231,270	248,342	5.9	7.4	13.6

Sources:

(1950) U.S. Bureau of the Census, U.S. Census of Population; 1950, Vol. II, Characteristics of the Population, Part 26, Montana, Chapter B. U.S. Government Printing Office, Washington, D.C., 1952, tables 25 and 43.

(1960) U.S. Bureau of the Census, U.S. Census of Population; 1960. General Social and Economic Characteristics, Montana; Final Report PC(1) 28C. U.S. Government Printing Office, Washington , D.C., 1961, tables 61 and 85.

(1970) U.S. Bureau of the Census, Census of Population; 1970. General Social and Economic Characteristics. Final Report PC(1)-28 Montana. U.S. Government Printing Office, Washington, D.C., 1971, tables 53 and 123.

Table 13

CIVILIAN INCOME FROM PARTICIPATION IN CURRENT PRODUCTION
MONTANA AND WESTERN MONTANA PLANNING AREA (1950-1970)
(1958 dollars)

	Income			Percent Change		
	1950	1959	1970	1950-59	1959-70	1950-70
PA 2	$ 160,092,000	$ 177,178,000	$ 268,224,000	10.7	51.3	67.5
Montana	$1,017,386,000	$1,029,000,000	$1,346,190,000	1.1	30.8	32.3

(Montana) U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C., Unpublished Data, 1974.

Table 14

POPULATION AND TOTAL EMPLOYMENT
MONTANA AND WESTERN MONTANA PLANNING AREA (1970 AND PROJECTED)

	Actual	Projected					Percent Change				
	1970	1980	1985	1990	2000	2020	1970-1980	1980-1990	1990-2000	2000-2020	1970-2020
Population											
Planning Area 2	157,428[1/]	156,790	157,380	156,130	155,050	152,020	-0.4	-0.4	-0.7	-2.0	-3.4
Montana	697,000	669,700	667,100	664,500	656,400	655,800	-3.9	-0.8	-1.2	-0.1	-4.5
Employment											
Planning Area 2	53,855[1/]	59,500	59,900	60,300	63,200	63,400	10.5	1.3	4.8	0.3	17.7
Montana	254,088[1/]	269,700	270,300	271,000	279,600	281,700	6.1	0.5	3.2	0.8	10.9

1/ Population and employment for April 1970; all other figures are annual averages.

Source: Derived from O.B.E.R.S. (Series "E").

Correspondingly, total Montana employment is projected to increase during each of the periods between 1970 and 2020, with the largest gains projected during the 1970's and 1990's.

It was earlier reported that population and employment grew at faster rates in the Planning Area than in Montana. The projections in table 13 imply a continuation of this general trend. For example, even though population is projected to decrease, the rate of decline is expected to be smaller in the Planning Area than in Montana (3.4 versus 4.5 percent declines, respectively, for the 1970 to 2020 period). Similarly, total employment in Western Montana is projected to increase by 17.7 percent between 1970 and 2020, while the corresponding figure for Montana is 10.9 percent.

The projected declines in population represent a reversal of past trends, but they do not necessarily represent a deterioration of the economy. For the most part, they simply represent the declining number of births shown in OBERS "Series E" projections. It is significant that total employment is projected to increase, although at slower rates; this implies there will be a higher ratio of jobs to population and a lower proportion of dependents than there are now in Western Montana.

More specific projections are:

Population for the total Planning Area will slowly decline through the year 2020, with some short term fluctuations.

Population density will continue to show greater increases in the Missoula area and in Flathead County.

The Native American population is expected to increase faster than the rest of the population. There will be a greater proportion of Native Americans in the job market.

Missoula County will continue to have the highest percent of the total population in the Planning Area.

Missoula and Kalispell can be expected to continue to be the major population and trade centers of the Area.

The greatest effects of crowding will probably be felt in Missoula, Flathead, Ravalli, and Lincoln Counties.

Present trends suggest that people in Western Montana will move away from areas with concentrated populations and into more sparsely populated areas, such as Sanders, Lincoln, and Granite Counties.

As the metropolitan areas continue to grow and expand, more people will move to outlying less populated areas forming strip development and bedroom communities which will remove agricultural land from productivity.

More second homes can be expected in the less populated portions of the Planning Area.

Total employment is projected to increase about 20 percent by 2020. The greatest growth is slated to occur during the 1970's and the 1990's, with only slight increases in the following decades.

Because of the rural lifestyles and scenic beauty, many people will continue to live in Western Montana even though they could be making more money elsewhere.

Civil Rights and Equal Employment Opportunity Legislation at the State and National levels should help resolve the disparate employment situation that exists among women and native Americans in Western Montana.

There will be a greater demand for programs at all levels of Government to help eliminate poverty.

2. Projected Per Capita Income and Earnings Per Worker: Actual and projected per capita personal income and earnings per worker for Western Montana and Montana are presented in table 15. These figures were calculated in terms of constant 1967 dollars to remove the effect of inflation.

Per capita personal income in the Planning Area is projected to grow from $2,710 in 1970 to $11,720 in 2020. The corresponding figures for Montana are $3,040 and $12,400. During this period, per capita income in the Planning Area will continue to be below that of Montana and the United States, but the deficiency will be reduced. For example, between 1970 and 2020, the figure for the Area is expected increase from 77.9 to 88.8 percent of the National average.

The projections for earnings per worker suggest that earnings in the Planning Area will improve relative to earnings in the State and the Nation. During 1970, earnings per worker in the Area were 86.0 percent of the National average; this figure is projected to increase to 91.2 percent by 2020.

Table 15

PER CAPITA INCOME AND EARNINGS PER WORKER
MONTANA AND WESTERN MONTANA PLANNING AREA (1970 AND PROJECTED)

	Actual	Projected				
	1970	1980	1985	1990	2000	2020
Per Capita Personal Income (1967 Dollars)						
Planning Area 2	$2,710	$3,840	$4,360	$5,050	$6,880	$11,720
Percent of U.S.	77.9	81.7	80.7	82.8	84.9	88.8
Montana	3,040	4,200	4,800	5,400	7,300	12,400
Percent of U.S.	87.4	89.4	88.9	88.5	90.1	93.9
Earnings per Worker (1967 Dollars)						
Planning Area 2	6,100	7,600	8,580	9,770	12,550	20,890
Percent of U.S.	86.0	87.3	87.5	88.8	89.6	91.2
Montana	6,410	7,950	9,000	10,190	13,050	21,650
Percent of U.S.	90.4	91.4	91.8	92.6	93.2	94.5

Source: Derived from O.B.E.R.S. (Series "E").

RESOURCE ELEMENTS

To coordinate this document with the resource assessment and long range program for resource use required by the Resources Planning Act (RPA), resources in Western Montana are discussed according to the 12 RPA "elements."

1. Recreation
2. Wilderness
3. Wildlife and Fish
4. Range
5. Timber
6. Water
7. Minerals
8. Human and Community Development
9. Protection
10. Lands
11. Soils
12. Facilities

Protection, Lands, Soils, and Facilities are "support elements"--that is, the activities involved in management of these elements are beneficial to management of all the other elements.

Information in many of the following sections can be supplemented by information on the subsection map of Western Montana (appendix 1). Geology, climate, and the earth's structure were used to delineate mapping units. These units were then further described in terms of characteristics such as physical processes, landform, slope, elevation, soils, climax vegetation, and water. This information was interpreted to determine potential for different resource uses and natural hazards and sensitivities to different uses.

The map was prepared in conjunction with the Land Systems Inventory, a method of land classification useful in National Forest land management planning. The inventory and subsection map are described in more detail in Section 7.11(C) of this document.

RECREATION ELEMENT

7.X - [redacted] RECREATION [redacted] ELEMENT

The mission of the Outdoor Recreation System is to provide outdoor recreation opportunities for the Nation. The system includes activities which: (1) identify and manage areas offering diverse recreation opportunities, (2) promote use and enjoyment by all segments of society, (3) protect National Forest scenic and cultural values, and (4) provide technical assistance and advice to private and other public landowners in developing forest-based recreation opportunities. Research is conducted to improve outdoor recreation management.

7.X1 - THE AREA TODAY

Western Montana offers a wide variety of outdoor experiences. There are numerous opportunities for viewing outstanding scenery, visiting cultural and historic sites, hiking, camping, fishing, hunting, skiing, and other activities. With the majority of land in western Montana under the jurisdction of the Forest Service, National Forests are an extremely important source of recreation opportunities.

A. Recreation Opportunities

1. Developed Recreation Sites: People exhibit preferences for a variety of recreation settings and activities, ranging from orientations toward natural environments to orientations toward highly developed areas. Thus, the National Forests must provide many kinds of recreation sites, with varying degrees of facility development and opportunities for different activities.

Table 16 indicates the number of picnic, camping, swimming, fishing, and boating sites on land managed by different agencies in western Montana. The majority of all of these kinds of sites are on National Forest land. Table 17 shows in more detail the types, capacity, and size of developed recreation sites in the Area's National Forests.

Many recreationists exhibit a preference for water-oriented activities and most lakes at lower elevations in western Montana National Forests (such as Seeley Lake) have facilities for camping, fishing, picnicking, boating, and swimming (although cold water and poor beaches limit most swimming to a few popular lakes).

2. Trails: Access is an extremely important factor in recreation use. Opportunities for certain activities may exist, but may never be realized if there is no access, or if trails and/or roads are not maintained. In some areas, adjacent or intermingled private land restricts access to portions of National Forests.

Table 16

RECREATION SITES AND MANAGING AGENCIES;
WESTERN MONTANA PLANNING AREA

	Picnic Units	Camping Units	Swimming Areas	Fishing Access	Boat Ramp
BLM	--	--	--	--	--
National Park Service	--	674	--	9	3
Bureau Sports Fisheries & Wildlife	35	--	--	4	--
Montana Fish & Game Department	125	530	14	43	25
State Forests	--	28	--	3	--
Indian Reservation	5	20	1	1	1
USFS	589--78%	1745--58%	32--68%	144--71%	47--62%
TOTAL	754	2997	47	204	76

Source: Montana Statewide Recreation Plan

TYPES, CAPACITY, AND SIZE OF DEVELOPED RECREATION SITES IN WESTERN MONTANA NATIONAL FORESTS

Type	Number of Sites Classed According to Capacity (Persons at One Time)							Total Capacity PAOT	Acres Developed Sites
	Under 25	26 to 75	75 to 150	151 to 300	300 to 600	Over 600	Total		
Observation	1	1					2	70	8
Boating	6	10	9	1			26	1,766	46
Swimming	--	4	7	3			14	1,530	29
Camp, Family	33	42	17	10			102	6,444	633
Camp, Group			2				2	250	13
Picnic, Family	4	13	5	1			23	1,405	84
Picnic, Group		2	1		1		4	655	41
Resort (Private)		9	1				10	552	87
Organization Site 1/									
Forest Service			1				1	124	23
Private	1			1			2	220	5
Recreation Residence	14	3	4	1			22	900	168
Winter Sports			1		2	3	6	4,975	612
Interpretive or Informational	1	2	1				4	225	6
TOTAL	60	86	49	17	3	3	218	19,116	1,755

Source: RIM Forms 2300-2c. Lincoln and Philipsburg Districts provided breakdown for portions within Planning Area

1/ Includes all necessary facilities such as lodges, cabins, etc.

Many trails within the National Forest System were constructed primarily to provide access for mining, fire management, and timber production. Some developed trails are not shown on maps, and thus are not known to recreation users. Yet, many of these trails may have recreational value. Increasing recreation use of popular trails and lack of adequate trail maintenance has created substandard conditions on many trails. An assessment of National Forest trails began in 1977 and is scheduled for completion within 2 or 3 years. The objectives of the assessment are to provide opportunities for a broad range of recreational experiences on National Forest trails.

Trails provide opportunities for walking for pleasure, hiking, horseback riding, trail bike and snowmobile use, and bicycling. They also provide access for camping, hunting, fishing, cross-country skiing, and other activities. Because such a wide variety of activities occur on trails, incompatible difference sometimes arise. For instance, hikers often prefer not to encounter horses and motorized vehicles on trails, and horseback riders often feel motorized vehicles interfere with horse use; however, motorized vehicle users generally do not feel that other trail uses interfere with vehicle use. Plans prepared by the Forest Service in response to Executive Order 11644, "Use of Off-Road Vehicles on the Public Land," will provide direction needed to administer and manage recreation trail use.

The 1968 National Trails Act instituted a National Trails System to promote travel, enjoyment, and appreciation of outdoor areas. The act identified two trails in western Montana to be studied for inclusion in the system--the Lewis and Clark Trail (which crosses the Area from east to west, branching south along the Bitterroot River into Idaho) and the Continental Divide Trail (which runs along the Area's eastern boundary). Large portions of these trails are in National Forests.

The Lewis and Clark trail would commemorate the journey of Captains Meriweather Lewis and William Clark, and would provide recreation opportunities along designated sections of their historic route. The Continental Divide trail would provide opportunities to hike most of the Continental Divide, from Canada to Mexico. Construction and/or reconstruction of many segments would be needed to include the Continental Divide Trail System in the National Trails

Besides these two trails, there may be other possible National Recreation Trails in the Planning Area. During trail assessment and planning, areas possessing outstanding scenery and recreational value will be considered for classification. Unit

3. Special Interest Areas: National Forest areas of unusual scenic, historic, prehistoric, scientific, natural, or other special interest can be administratively designated "Special Interest Areas." This designation insures that the unique value(s) of an area will be given special management attention. Although not designated for recreation purposes, such areas can provide recreation opportunities. Special interest areas in western Montana are shown in tables 18 and 19. Historic Sites and

Table 18

HISTORIC SITES IN WESTERN MONTANA*

County	No. Inventoried1/ Sites	County	No. Inventoried1/ Sites
Flathead	48	Missoula	55
Granite	47	Powell	85
Lake	62	Ravalli	32
Lincoln	46	Sanders	84
Mineral	26		

*SOURCE: Montana Historic Preservation Plan, Volumes I, II, and III, Montana Fish and Game Commission, July 1975.

1/Sites listed on the Montana State Historical Register

Table 19

SPECIAL INTEREST AREAS; WESTERN MONTANA

Type of Area	National Forest	Gross Acres
SCENIC AREA		
Northwest Peaks	Kaniksu, Kootenai	6,544
Ross Creek	Kootenai	100
Ten Lakes	Kootenai	6,195
HIKING AREA		
Jewel Basin	Flathead	14,961
RESEARCH AREA		
Coram Experimental Forest	Flathead	839

SOURCE: USDA Forest Service, Northern Region, Missoula, Montana 59801

a. Cultural Resources: Cultural resources are the remains of historical and prehistorical human activity. These resources are often extremely fragile and can be obliterated by relatively minor modifications of the ground surface. Known historic sites in western Montana are shown in table 18. National Forests contain much of the as yet undisturbed evidence of prehistoric and early historic cultural resources.

In accordance with provisions of the 1906 Antiquities Act, the Forest Service regulates public examination of cultural resources on National Forest lands and protects sites and objects of antiquity from unauthorized appropriation, excavation, injury, or destruction.

The National Historic Preservation Act of 1966, Executive Order 11593, and rules and regulations for their implementation require Federal agencies to consider cultural resources under their jurisdiction when making management plans. At minimum, this involves locating, inventorying, and nominating to the National Register of Historic Places all qualified sites, buildings, districts, and objects.

b. Natural History Resources: Outstanding geological formations, significant fossil evidence of the past, relic flora and fauna, habitats supporting rare species, and unique ecological communities are examples of natural history resources. For management purposes, natural history areas are further identified as having either scenic, geological, botanical, zoological, or paleontological value. There are three scenic areas in western Montana Forests (see table 19).

c. Research Areas: Experimental forests and ranges can be established on Federal land for research purposes. One such area is located in the Flathead National Forest (see table 19).

d. Hiking Area: Jewel Basin in the Flathead Forest is designated a Hiking Area (see table 19).

4. The Visual Resource: Western Montana offers a wide spectrum of natural and man-influenced viewing experiences, ranging from outstanding and unique scenery to landscapes which many find monotonous. Steep mountainous terrain is the dominant visual feature of National Forest landscapes throughout the Area. Water features and vegetative patterns are varied. Broad valley bottoms are generally in private ownership and most of the Area's major transportation routes and communities are situated on private land.

Developments associated with land use and management usually create, or have the potential to create, some degree of deviation from the natural characteristic landscape. The Forest Service recognizes that the visual landscape is a resource that must be managed. The objective of National Forest landscape management is to "manage all National Forest System lands

so as to attain the highest possible visual quality commensurate with other appropriate public uses and benefits." 1/

The National Forest Visual Management System is being used to evaluate Western Montana's visual resource. This system is described in detail in USDA Handbook 462, National Forest Landscape Management, Volume 2, Chapter 1, The Visual Management System. In the system, visual landscapes are classified according to variety classes, sensitivity levels, and distance zones. In some cases, this system is refined to better address local conditions or land use planning procedures for Western Montana National Forests.

Three "variety classes" identify the scenic quality of the landscape: Class A indicates a distinctive landscape; Class B, a common landscape; and Class C a minimal quality landscape.

People's concern for the scenic quality of National Forests is measured in terms of "sensitivity levels." In the Planning Area, sensitivity is based on the type of use and the type of user. Four levels of sensitivity indicate degrees of people's concern for the visual landscape, depending on: 1) the type of travel route, water body, or use area from which one is viewing an area; 2) whether the travel route, water body or use area is of National, Regional, or local importance; and 3) whether the type of person using the road, water body, or use area is seeking recreation activities. It is estimated that on all primary travel routes and water bodies (which receive a great deal of out-of-State use) and in all classified areas, at least 3/4 of users have a high level of visual sensitivity.

Users' visual sensitivity to a particular landscape may vary, depending on the distance to the area being viewed. To allow consideration for distance, three "distance zones" are delineated from travel routes, water bodies, and use areas: the foreground, middleground, and background.

Landscapes with similar combinations of variety classes, sensitivity levels, and distance zones are assigned "visual quality objectives", which range from preserving the natural landscape to allowing activities which result in significant modification of the landscape.

B. Recreation Use

Recreational use of National Forests throughout the United States in 1976 totaled nearly 2 million visitor days. 2/ This represented a 33.6 percent increase over use in 1967 (see table 20). Recreational use in Montana National Forests increased 38.2 percent during these years, and use in the Planning Area increased at an even greater rate--40.7 percent.

Table 20 indicates that camping, motorized recreation, hunting, cold-water fishing, and use of resorts and recreation residences have remained the

1/ Forest Service Manual 2380.2.

2/ A visitor day represents the use of an area for a total of 12 person-hours by one or more people, either continuously or during several visits.

Table 20

RECREATIONAL USE IN THE UNITED STATES, MONTANA, AND WESTERN MONTANA NATIONAL FORESTS; MAJOR ACTIVITIES, 1967 and 1976

	1967		1976	
	Visitor Days of Use	% of Total Use	Visitor Days of Use	% of Total Use
United States				
Camping	41,257,000	27.6	56,871,200	28.4
Motorized Recreation	37,623,700	25.1	50,464,500	25.2
Hunting	13,248,600	8.9	14,059,400	7.0
Cold-water Fishing	11,530,100	7.7	12,006,700	6.0
Resorts	11,496,200	7.7	11,022,100	5.6
Other	34,491,500	23.0	55,504,200	27.8
TOTAL	149,647,100	100.0	199,928,100	100.0
Montana				
Camping	1,005,500	18.1	1,734,700	22.6
Motorized Recreation	1,308,600	23.5	2,197,000	28.6
Hunting	685,400	12.3	720,500	9.4
Cold-water Fishing	731,000	13.1	686,700	8.9
Resorts	501,300	9.0	348,100	4.5
Other	1,333,500	24.0	2,002,900	26.0
TOTAL	5,565,300	100.0	7,689,900	100.0
Western Montana				
Camping	432,500	17.5	663,800	19.1
Motorized Recreation	521,500	21.1	1,173,800	33.8
Hunting	314,900	12.8	349,100	10.1
Cold-water Fishing	401,200	16.3	343,900	9.9
Resorts	159,600	6.5	80,000	2.3
Other	636,500	25.8	858,700	24.8
TOTAL	2,466,200	100.0	3,469,300	100.0

major recreation activities throughout the Nation as well as in Montana and the Planning Area.

1. Motorized Recreation: Nationally, recreation activities in which motorized vehicles are used receive the second-most use of all other recreation activities in National Forests. In Montana and western Montana National Forests, however, motorized recreation receives the most use. There has been a phenomenal increase in use of motorized recreation vehicles in western Montana Forests--use grew 125 percent between 1967 and 1976. While automobiles remain the most-used vehicle for motorized recreation, off-road vechicles (ORV's), such as jeeps, motorcycles, snowmobiles, etc. have become increasingly popular in recent years. Snowmobile use is increasing at a more rapid rate than motorcycle use. Motorcycle and snowmobile use are very similar, although motorcycle use in National Forests is generally more confined to roads and trails than is snowmobile use. However, some motorcycle users do travel cross-country, and there are more demands for cross-country trails and hill-climbing areas.

2. Camping: Throughout the Nation, more visitor days are spent camping than in any other recreation activity in National Forests. In Montana and western Montana Forests, camping receives the second-most use. Use in western Montana grew 53.4 percent between 1967 and 1976. Despite this increase, campgrounds in the Area have been closed due to administrative problems and a lack of funding for maintenance. There has been some new campground construction, but it is limited to special situations, such as construction of facilities to serve reservoirs where there is concentrated use. In addition, there are problems with littering, vandalism, and law enforcement in campgrounds. In most camping areas, sanitation and waste disposal are adequate.

3. Hunting and Fishing: Hunting and fishing receive the third- and fourth-largest amount of all recreation activities in the Nation, State, and Planning Area's National Forests. It has been estimated that in 1970, 12,000 nonresident hunters and 32,500 nonresident fishermen contributed $197,000 and $317,000, respectively, to the direct economy of Montana. 1/

4. Resorts and Recreation Homes: Resorts and recreation homes comprise the fifth-largest National Forest recreation use in the Nation, Montana, and the Planning Area. However, resort and recreation home use in 1976 was less than in 1967 at all three levels--in western Montana Forests, use dropped 50 percent between these years.

5. Other Activities: Many other activities, such as skiing, canoeing, kayaking, etc. are pursued on National Forest land. Use in these other activities has been combined and is shown in the "other" category of table 20. As a whole, use in these "other" activities increased 35 percent between 1967 and 1978.

C. Economic Importance of Tourism

Tourism is an important component of the Area's economy. Forty percent of recreationists in Montana in 1973 were from outside the State. 1/ However, recreation facilities are predominantly used by Montana residents, who accounted for 60 percent of use in 1973. Only around Glacier and Yellowstone National Parks is this trend reversed.

Money spent for recreation (transportation, food, lodging, equipment, etc.) is a principal source of income for many Montanans. Polzin and Schweitzer have estimated that every tourist dollar yields $0.22 direct wages and income to Montana residents. 2/ In 1971, approximately 3,770,000 out-of-State visitors spent an estimated $33 million in Montana. 3/ The average out-of-State visitor to Montana spends 33 percent of his money on food, 27 percent on lodging, and 26 percent on transportation. 4/

1/ Montana State Comprehensive Outdoor Recreation Plan, 1973.
2/ "Economic Importance of Tourism in Montana," USDA Forest Service Research Paper, INT-171, 1975, p. 7.
3/ Ibid, p. 10
4/ Ibid. p. 2

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7. ASSUMPTIONS FOR TOMORROW

1. Camping and picnicking facilities will be adequate to meet projected demands until 1990, except during peak demand periods.

2. Boating and swimming opportunities will be adequate to meet projected demands until 2005, except during peak demand periods.

3. Existing winter sports facilities will meet projected demands until 2020, except during peak demand periods.

4. Key recreation sites will not meet projected demands during peak periods of use.

5. The land base is adequate to satisfy projected demands for dispersed recreation use.

6. More pressure will be placed on the land by increasing use of the recreation resource; other resources could be [redacted] by recreation use.

Uses affected

7. Use regulations may be needed to maintain opportunities for high-quality recreation experiences.

8. Recreational carrying capacity will be reached only in limited areas, such as destination-type campgrounds near water bodies.

WILDERNESS ELEMENT

7.2 WILDERNESS ELEMENT

The purpose of the National Forest wilderness system is to provide opportunities to experience unmodified environments. Activities center around 1) identifying National Forest wild land resources to be managed for preservation of wilderness values; 2) developing more effective methods of wilderness allocation and management; and 3) helping other public landowners provide wilderness opportunities.

7.21 THE AREA TODAY

With the 1964 Wilderness Act, Congress charged the Forest Service, Park Service, and Fish and Wildlife Service with responsibility for establishing and managing the National Wilderness Preservation System (NWPS). In the Act, 54 previously designated National Forest wilderness, wild, and canoe areas were established as the first components of the NWPS. The Act also directed that existing National Forest primitive areas be studied for inclusion in the NWPS--the Mission Mountains Primitive Area in Western Montana was made a wilderness through such study.

A. Existing National Wilderness Preservation System and Current Wilderness Legislation: Throughout the United States, 129 areas totaling about 13 million acres are included in the NWPS. The majority of wilderness (89 areas with 12 million acres) is within National Forests. Montana has X8 wildernesses with acreage totaling over 2 million. Of these, three areas, the Mission Mountains, and Cabinet Mountains Wildernesses, and portions of 4 areas, the Bob Marshall, Anaconda Pintlar, Scapegoat, and Selway-Bitterroot Wildernesses, are within the Western Montana Planning Area (see table 21).

~~In addition, the Department of Agriculture administration has endorsed wilderness designation of 29,500 acres of the Welcome Creek area in the Lolo National Forest; this area is included in House Bill 3454, which, if passed, will make Welcome Creek a classified wilderness~~. The 1976 Omnibus Wilderness Act directed the Forest Service to study the 393,000-acre Great Bear Area in the Flathead and Lewis and Clark National Forests for possible inclusion in the NWPS. Four additional wilderness study areas in Western Montana were identified in the 1977 Montana Wilderness Study Act:

Bluejoint Wilderness Study Area (Bitterroot NF)	61,000 acres
Sapphire Wilderness Study Area (Bitterroot and Deerlodge NF's)	94,000 acres
Mount Henry Wilderness Study Area (Kootenai NF)	21,000 acres
Ten Lakes Wilderness Study Area (Kootenai NF)	34,000 acres

Table 21

COMPONENTS OF THE NATIONAL WILDERNESS PRESERVATION SYSTEM
IN WESTERN MONTANA NATIONAL FORESTS

Area	Planning Area National Forests	Acres in Planning Area	Total Acres
Anaconda-Pintlar	Bitterroot, Deerlodge	85,979	158,516
Bob Marshall	Flathead	709,356	949,356
Cabinet Mountains	Kaniksu, Kootenai	94,272	94,272
Mission Mountains	Flathead	73,877	73,877
Scapegoat	Helena, Lolo	155,529	239,936
Selway-Bitterroot	Bitterroot, Lolo	251,930	1,235,081
Welcome Creek	Lolo	29,500	29,500
		1,440,443	2,780,538

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Segments of the south, middle, and north forks of the Flathead River are designated Wild and Scenic Rivers under the Wild and Scenic Rivers Act. Managed to preserve their free-flowing character, these rivers add to the Area's wild land resource.

B. RARE I: In an effort to set priorities for wilderness study, the Forest Service, in 1970, began a study ("Roadless Area Review and Evaluation," or RARE) of roadless and undeveloped lands in the National Forest System.

The inventory from this study was completed in 1972 and identified some 56 million acres of roadless lands. The study culminated in 1973 with the filing of the RARE Final Environmental Statement establishing 274 new Wilderness Study areas, totaling 12.3 million acres. The Chief also established the policy that the remaining 40+ million acres of roadless and undeveloped lands were to be reviewed during the land management planning process for possible inclusion as Wilderness Study Areas.

The RARE process suffered from several deficiencies; most notably:

1. The inventory criteria were too general, resulting in inconsistent application from Region to Region of the Forest Service. Some areas were overlooked altogether.

2. Areas in the Eastern United States were not included.

3. The public was not involved in the early stages of the process.

4. The inventory and evaluation criteria followed a "pure" interpretation of the Wilderness Act, resulting in elimination of some areas that should have been considered according to the intent of the Act.

Appeals, lawsuits, and injunctions over the way the Forest Service was handling the wilderness question in its land management plans began to tie up the land management planning process and delay implementation of completed plans.

A new process for speeding completion of wilderness allocation for the entire National Forest System was needed, and in 1977 the Forest Service initiated a second RARE study, including a new inventory and different criteria for evaluating wilderness quality.

C. RARE II: The objectives of RARE II are to locate National Forest roadless and undeveloped areas and determine which should be designated wilderness, which should be put to other uses, and which may require further study. The overall purpose of RARE II is to round out the NWPS. RARE II involves three main phases:

1. An inventory of all areas in the National Forest System that could possibly qualify as wilderness candidates under the criteria in the Wilderness Act. The inventory [redacted] an initial Forest Service inventory and a public inventory. involved

2. An evaluation to identify what inventoried areas would best fill gaps in the existing National Wilderness Preservation System.

3. A recommendation to Congress and the American people of which of the inventoried areas should be included in the NWPS, which should be further studied for inclusion, and which should be allocated for nonwilderness uses.

The inventory phase of the RARE II process was completed in November, 1977--it identified 1,920 areas of roadless and undeveloped land totaling 65.7 million acres. Management of an additional 34 areas for which land use plans have been completed was deferred until the areas are reevaluated in the RARE II process. Over 63 million of the inventoried acres (1,615 areas) are in National Forests in the West, and over 9 million acres (237 areas) are in the Forest Service's Northern Region. Montana contains 6,534,410 inventoried acres (180 areas); 1,788,752 of these acres (73 areas) are in the Western Montana Planning Area. Four Montana areas (460,620 acres) for which land use plans have been completed will be reevaluated in RARE II. They are:

Area	Gross Acres
Bitterroot (Bitterroot NF)	81,200
Stony Mountain (Bitterroot NF)	50,400
Allan Mountain (Bitterroot NF)	113,900
Swan River Island (Flathead NF)	550
	246,050

The characteristics of the inventoried areas will be evaluated (characteristics such as ecosystem, landform, wildlife, accessibility, and availability to population center) along with the potential social and economic costs of wilderness designation. Results of the evaluation will be presented in a Draft Environmental Statement to be published in May or June, 1978.

A

Recommendations on the allocation of areas will then be made, based on the analyses made during evaluation and on the public's comments regarding the Draft Environmental Statement. The recommendations will be made in a Final Environmental Statement late in 1978 or early in 1979.

With land use plans not completed, management of many roadless and undeveloped areas in Western Montana have been undecided for quite some time. Although not designated wilderness, such areas have been managed to preserve their wilderness characteristics. At the same time, many of these areas contain resources valuable for uses other than wilderness. The RARE II process will speed resolution of administrative problems and political conflicts resulting from the uncertainty about use of these areas.

D. Managing Wilderness Recreation: Allocating wilderness is only one responsibility assigned to the Forest Service by the Wilderness Act. Equally important is the task of wilderness management, which often has received less attention in the midst of efforts to classify remaining wild lands.

Because recreation is an important use of wilderness, recreation management is essential to wilderness management. Major recreation activities in National Forest wilderness are camping, hiking, fishing, hunting, horseback riding, and enjoying unique and unusual environments (see table 22). Recreation use in National Forest wildernesses, like recreation use in all National Forest areas, has been increasing. Between 1967 and 1976, Nationwide National Forest wilderness recreation use increased 51 percent. In Montana, use grew 97 percent, and in the Western Montana Planning Area, it grew 95 percent.

As the remaining roadless lands are allocated, those which remain roadless become even more rare and valuable. As use of this increasingly valuable resource grows, wilderness management becomes even more important. If undeveloped areas are to be managed both to preserve wilderness values and to provide increased recreation opportunities, many difficult questions must be resolved.

The Wilderness Act defines wilderness as an area "untrammeled by man," where man is a "visitor who does not remain." [redacted], but extensive use leads to physical deterioration of trails and campsites and disrupts the natural ecology of an area. How do managers maintain wilderness integrity while accommodating increased recreation use?

A wilderness recreation experience should offer opportunities for solitude, but as use in popular areas increases, opportunities for solitude diminish. How do numerous encounters with other trail and campsite users affect the quality of a wilderness experience? In some areas, conflicts arise between different types of users--for example, some hikers prefer not to meet horse riders on trails. How do managers provide satisfactory opportunities for all users?

Table 22

WILDERNESS AND PRIMITIVE RECREATION AREA USE;
UNITED STATES, MONTANA, AND WESTERN MONTANA MAJOR ACTIVITIES
(1967 and 1976) 1/

	1967		1976	
	Visitor Days of Use	% of Total Use	Visitor Days of Use	% of Total Use
United States				
Camping	1,829,900	38.9	2,511,000	35.3
Hiking	545,700	11.6	1,348,900	19.0
Enjoy unique/unusual environment	412,600	8.8	673,500	9.5
Cold-water fishing	702,600	14.9	774,400	10.9
Hunting 2/	370,000	7.9	349,600	4.9
Horse	239,000	5.0	285,500	4.0
Other 3/	606,600	12.9	1,161,800	16.4
TOTAL	4,706,400	100.0	7,104,700	100.0
Montana				
Camping	63,800	26.6	91,400	19.3
Hiking	24,200	10.1	105,700	22.4
Enjoy unique/unusual environment	14,800	6.2	57,400	12.1
Cold-water fishing	44,000	18.3	77,100	16.3
Hunting 2/	39,500	16.5	59,300	12.5
Horse	31,700	13.2	45,000	9.5
Other 3/	21,800	9.1	37,100	7.9
TOTAL	239,800	100.0	473,000	100.0
Western Montana				
Camping	37,800	27.3	32,000	11.8
Hiking	10,000	7.3	65,700	24.3
Enjoy unique/unusual environment	6,200	4.5	32,900	12.1
Cold-water fishing	28,600	20.6	53,200	19.7
Hunting 2/	22,300	16.1	35,100	13.0
Horse	16,800	12.1	29,800	11.0
Other 3/	16,700	12.1	21,900	8.1
TOTAL	138,500	100.0	270,600	100.0

1/ USDA Forest Service; Recreation Information Management (RIM) data; 1967 and 1976.
2/ Includes big and small game, upland birds, and waterfowl.
3/ Includes all other RIM use categories except camping, hiking, enjoying unique/unusual environment, cold-water fishing, hunting, and horseback riding.

Management plans for the Anaconda-Pintlar and the Bob Marshall Wildernesses have addressed some of these problems. Both plans limit the number of stock that can accompany one party and stock use on some trails has been prohibited. A maximum number of persons ~~who can accompany one~~ in a party has been set, and limits have been placed on the length of time one party can occupy a campsite. Commercial uses have also been restricted. The above are some of the more common methods used to control use and protect the wilderness resource and the wilderness experience in the Anaconda-Pintlar and Bob Marshall, as well as other wildernesses throughout the nation. When management plans are designed for other wildernesses in Western Montana, similar restrictions may be needed.

7.2 ASSUMPTIONS FOR TOMORROW

1. Results of RARE II will indicate the amount of additional classified wilderness needed in Western Montana.

2. Pressures for additional designation of wilderness will intensify.

3. Conflicts will result from increased wilderness use; additional educational efforts and application of use restrictions will be necessary to resolve conflicts and to maintain the integrity of the wilderness resource.

4. Wilderness will become increasingly important for scientific and educational purposes.

5. Local, regional, and Nationl demands will increase for unroaded recreation areas which have fewer use restrictions and greater visitor carrying capacities than do classified wildernesses.

WILDLIFE AND FISH ELEMENT

7.3 WILDLIFE AND FISH ELEMENT

The purpose of the Wildlife and Fish Habitat System is to protect and improve wildlife and fish habitat. Special emphasis is placed on habitat of threatened and endangered species. Management is closely coordinated with the State of Montana, which has responsibility for controlling wildlife and fish populations. Coordination with the State involves: 1) Close working relations among National Forest, State, and private land managers; 2) Cooperative forestry programs designed to assist State and private land managers; and 3) Research programs that define environmental requirements of fish and wildlife and provide management alternatives through which these requirements can be attained.

National Forest wildlife management in the western portion of the Planning Area is coordinated with management of adjacent Idaho Forests, Glacier National Park, and the Flathead National Forest.

7.31 THE AREA TODAY

Almost every acre within the Planning Area, including both public and private lands, contains wildlife and/or fish resources. Diversity of habitats provides for a variety of wildlife species, particularly big game; such diversity is found in few other portions of the United States outside of Alaska. Fisheries include both cold water and warm water spiny-rayed species.

A. Big Game: Moose, elk, mule deer, white-tailed deer, mountain goat, bighorn sheep, black bear, grizzly bear, and mountain lion are common throughout portions of the Planning Area. Woodland caribou are reported occasionally along the Canadian border. Bison and antelope are found on the National Bison Range near Moise, Montana. The 18,540-acre National Bison Range managed by the U.S. Fish and Wildlife Service, was established to allow people to observe bison in a free-roaming environment. Table 23 shows population estimates for primary big-game species in the Area's National Forests.

Three game ranges in the Area are managed by the State of Montana, primarily for the production of winter forage for big game. They are:

1.	Blackfoot-Clearwater State Game Range	49,617 acres
2.	Threemile State Game Range	2,316 acres
3.	Bitterroot State Game Range	2,442 acres

Smaller ranges area scattered throughout the Area.

Table 23

ESTIMATED POPULATIONS OF BIG GAME SPECIES
IN WESTERN MONTANA NATIONAL FORESTS; 1965 AND 1974

Fiscal Year	White-tail Deer	Mule Deer	Elk	Moose	Mountain Sheep	Mountain Goat	Black Bear	Grizzly Bear
1965	48,070	48,350	29,305	2,143	671	3,067	7,375	502
1974	44,460	40,200	23,000	2,296	646	1,860	8,220	307

Source: National Forests' annual statistical reports.

Table 24

HUNTER HARVEST AND SUCCESS RATES
FOR BIG GAME IN WESTERN MONTANA; 1966-1974

Species	1966		1970		1974	
	Harvest	Success	Harvest	Success	Harvest	Success
Elk	6,537	25%	6,024	17%	4,659	11%
Deer (both species)	14,158	57%	18,376	52%	12,927	27%
Moose	210	74%	191	83%	177	76%
Mountain Goat	335	35%	174	42%	148	50%
Mountain Sheep	5	25%	8	65%	21	86%

Source: Montana Department of Fish and Game (P.R.W. 120-1 and 2).

A

Based on the number of animals harvested, white-tailed deer is the most important big-game species in Western Montana. Mule deer and elk are almost as important in terms of harvest. In recent years, antlerless deer seasons and either-sex elk and deer hunting seasons have been common in Western Montana. Special permits (via drawing) are required to hunt moose, bighorn sheep, and mountain goats, and special licenses are required for both black and grizzly bear and mountain lions. There are no hunting seasons for bison, antelope, or caribou. Hunter harvest and success rates for the primary big-game species in Western Montana from 1966 to 1974 are shown in table 24. Figure 4 shows deer and elk range.

In 1974, big-game hunters spent about 350,000 man-days in Western Montana. Between 10,000 and 20,000 deer--60 to 70 percent of these are white-tails--and 4,000 to 7,000 elk are harvested each year. Black bear harvest figures vary from 600 to 1,200 annually and moose from 500 to 600; grizzly bear harvested are limited to 25. Annual mountain goat and mountain sheep harvests average about 100 and 15, respectively. 1/

The availability of big game is a major supporting factor in the Area's recreation industry. Annual expenditures (for license sales, hunting equipment, gas, etc.) are estimated at $8,000,000 to $10,000,000. 2/

B. Upland Game: Ruffed, Franklin, and blue grouse are well-established and relatively abundant native upland game species in the Planning Area. Some ptormagan are found above timberline, mostly in Glacier National Park. A small population of Columbian sharptail grouse are found in the Tobacco Valley. Sage grouse have occasionally been reported where there is suitable habitat. Merriam's turkey, Chinese ring-necked pheasant, and Hungarian and chukar partridge have been introduced into Western Montana. The habitat of these game birds is limited.

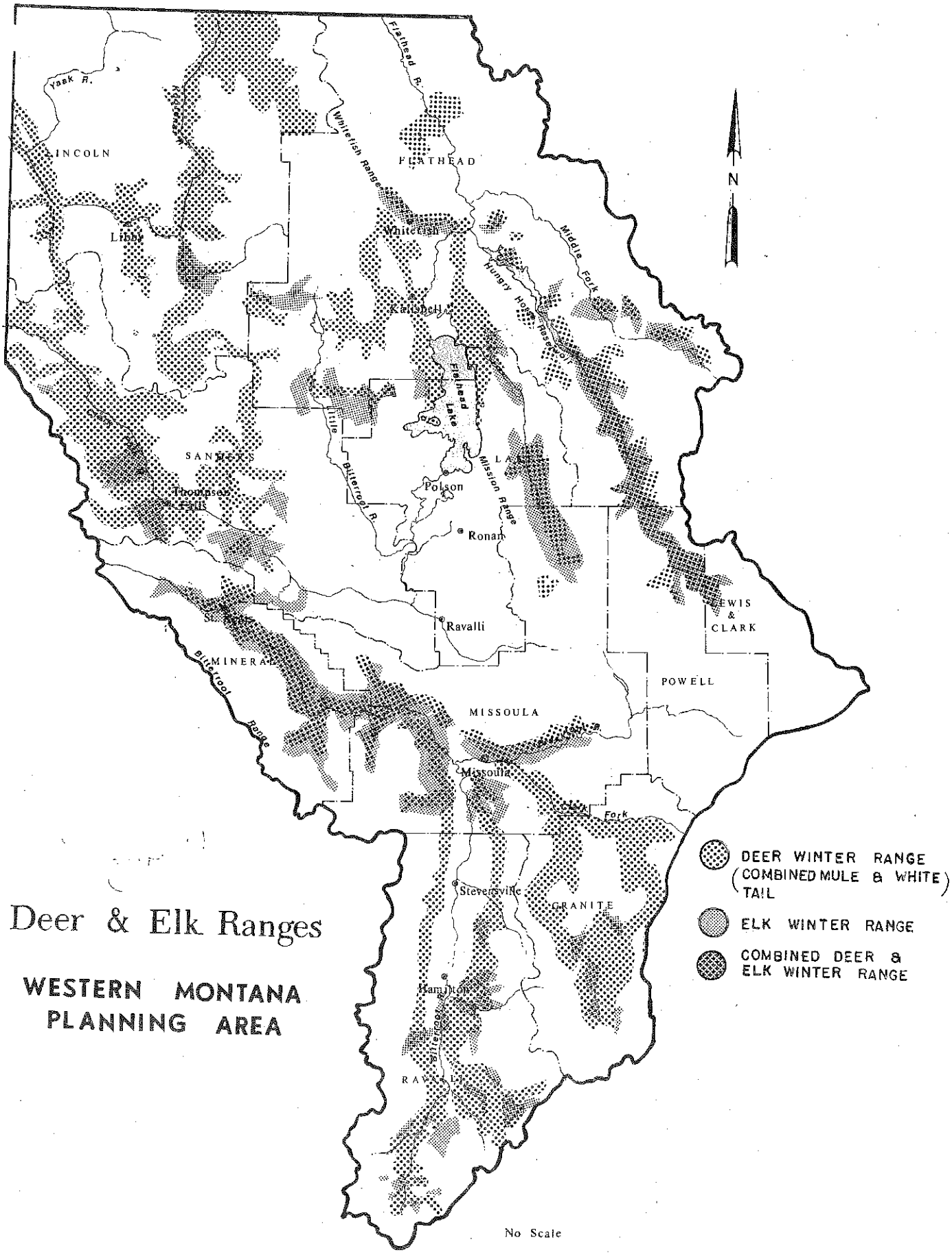
In 1974, about 150,000 man-days were spent hunting upland game. 3/ Harvest figures for that year are as follow:

Chinese ringnecked pheasant - 10,000 to 20,000
Ruffed grouse - 50,000
Blue grouse - 30,000
Franklin's grouse - 25,000

Hungarian and chukar partridge are a minor species in upland game harvests.

Upland game hunting generates about $2 million in economic benefits to Montana annually. 4/ When compared to big game, upland game have the greater potential to accommodate increased hunting because their reproductive rate is much higher than their harvest rate. Native grouse species could easily withstand three times their present harvest.

1/ Montana Department of Fish and Game, Hunter Questionnaire Report.
2/ U.S. Fish and Wildlife Service, Survey of Hunting and Fishing, 1975.
3/ Montana Department of Fish and Game, data from Hunter Questionnaires.
4/ U.S. Fish and Wildlife Service, Survey of Hunting and Fishing, 1975.



Deer & Elk Ranges

WESTERN MONTANA PLANNING AREA

No Scale

Two Montana Game Management Areas are maintained in the Planning Area for upland game birds and waterfowl--Pablo (387 acres) and Ninepipe (2,755 acres).

C. Waterfowl: While Western Montana is not an important waterfowl production area, the abundant supply of water in the Area's broad valleys renders it an important migration route during spring and fall. All of the Planning Area is within the Pacific Flyway. Some 30 species of waterfowl pass through Western Montana during migration. Mallards, American mergansers, and golden eyes are the most common ducks that nest in the Area. Canada geese are common yearlong residents of Flathead Lake and are found along some major rivers in the Area. Canada goose and mallard are the species most sought after by hunters.

Three National Wildlife Refuges in the Planning Area are managed by the U.S. Fish and Wildlife Service for production of waterfowl. They are:

1.	Pablo National Wildlife Refuge	2,542 acres
2.	Ninepipe National Wildlife Refuge	2,022 acres
3.	Ravalli National Wildlife Refuge	2,290 acres

Administered by the U.S. Fish and Wildlife Service for the production of waterfowl.

The National Forests play only a minor role in waterfowl management. Most prime habitat for waterfowl is on other public or private land in the valleys. A few species of duck breed in some of the higher elevation lakes situated in National Forests; however, these species are rarely hunted.

Montana hunters spend 50-75,000 man-days harvesting 65-75,000 ducks and geese. This hunting has a projected economic value of $1,000,000 to $2,000,000 annually. 1/

D. Nongame Species: There is an abundance of small mammals throughout the Planning Area. Nongame species include the following furbearers: fisher, marten, mink, river otter, beaver, and muskrat. Over 40 mammals other than furbearers and game species are common; most common are the Columbian ground squirrel, woodrat, porcupine, yellow pine chipmunk, yellow-bellied marmot, and white-footed mouse.

Over 200 species of nongame birds, ranging in size from hummingbirds to golden eagles, are found in the Area.

The most important furbearers harvested are beaver, marten, mink, and muskrat. A few fisher, wolverine, badger, raccoon, weasel, and skunk are also taken. Average values for fur fluctuate widely (from $100,000 to $300,000 annually), depending on demands.

1/ Montana Department of Fish and Game, data from Hunter Questionnaires.

E. Threatened and Endangered Species: Two endangered species, the northern Rocky Mountain wolf and the peregrine falcon, are native to Western Montana. The Area also supports the largest population of grizzly bear, a threatened species, in the 48 contiguous States.

The Endangered Species Act of 1973 (Public Law 93-205) directs that high priority be given to preservation of "critical" habitats of threatened and endangered species on all public lands. The Act further states that all Federal departments and agencies will ensure that their actions will not destroy or modify the "critical" habitats of these species.

The Rocky Mountain wolf can adapt to a wide variety of vegetative types, but must have large herbivores to prey upon. The decline in peregrine falcon populations is most closely associated with eggshell thinning caused by pesticides (florinated hydro-carbonated group). Grizzly bears can adapt to a variety of habitats, as long as there is little human influence. Acres of estimated occupied grizzly bear habitat in the Area are shown below:

Bob Marshall Wilderness	950,000 acres
Cabinet Mountains Wilderness	94,000 acres
Mission Mountains Wilderness	74,000 acres
Scapegoat Wilderness	75,000 acres
Glacier National Park	1,013,120 acres

F. Fisheries: When compared to other cold water fisheries throughout the United States, the Area's cold water fishery resource is of National significance. Native sport fish found in the Western Montana Area are westslope cutthroat and Dolly Varden trout, mountain whitefish, and Arctic Grayling. Introduced species are Yellowstone cutthroat, rainbow, eastern brook, brown, and lake trout, lake whitefish, and kokanee salmon. There are also several species of warm water fishes, such as largemouth bass, yellow perch, sunfish, and northern pike in lakes and streams.

Trout offer the greatest sport fishing opportunities and there are more opportunities to manage trout than other species in the Planning Area because trout habitat requirements are more common. In addition, there are more streams than lakes in the Area, and streams offer easier access for management than do lakes, many of which are situated on private land. In the Planning Area, fluvial and adfluvial populations of westslope cutthroat trout are found primarily in streams and lakes in the Flathead National Forest. Pure strains of westslope cutthroat are found only in the upper reaches of several drainages on the Flathead and, to a lesser extent, on the Lolo, Bitterroot, and Kootenai National Forests. The main reason for the demise of pure strains of westslope cutthroat has been probably hybridization with other spring spawners, such as rainbow and Yellowstone cutthroat trout. Habitat deterioration has also contributed to the declining population.

Dolly Varden are the largest of the indigenous fishes found in Western Montana. Unlike the cutthroat, Dolly Varden have been able to compete favorably with introduced salmonids and to maintain a hold on their native range where streams are not blocked to migration. Mountain whitefish are the most widely distributed and abundant of the Area's indigenous species. Lake whitefish, an introduced species, are found in Flathead, Whitefish, and Blaine Lakes.

Warm water fishes include largemouth bass, yellow perch, sunfish, and northern pike. Many lakes and streams in the Planning Area have populations of warm water fish.

The number of miles of stream and acres of lakes that comprise Western Montana's fishery habitat are shown in table 25.

Habitat deterioration poses the most serious threat to the propagation of selfsustaining salmonid populations. Sedimentation results in the most serious deterioration of fish habitat. A number of State laws have been passed since 1963 to protect stream fisheries from physical alteration. However, there is still a great need for habitat improvements. Forest Service programs are being planned to include beneficial fish management activities such as fish barrier removal, stream bottom fencing, streambank revegetation, and erosion control devices.

During the 1974 license year, about 115,000 fishing licenses were sold by the Missoula and Kalispell Fish and Game Regions. Of this total, 56 percent were nonresident licenses. It is estimated that most nonresident license holders come to Montana to fish streams. 1/ Forest Service dollar values assigned to sport fishing range from $7.50 to $28.00 per angler day. 2/ The difference is dependent on species, stream classification, size of the fish, catch rate, species diversity, and esthetics. For example, a high mountain lake with a population of small eastern brook trout might be assigned a value of $7.50 per day, while the value assigned to a high quality steelhead fisheries would be $28.00 per day.

1/ Montana Department of Fish and Game, Fisheries Mail-In Survey.
2/ An angler day consists of 4 hours of fishing per angler in any 1 day.

Table 25

*FISHING WATERS IN MONTANA AND WESTERN MONTANA NATIONAL FORESTS

	No. of Streams**	Miles of Streams	No. of Lakes	Acres of Lakes
Montana	2,271	17,502	2,263	130,009
Western Montana				
Bitterroot	--	607	92	3,613(T)
Flathead	526	3,000	721	43,506
Kootenai	476	1,575	109	36,194
Lolo	667	3,500	96	5,220

*Includes all waters contributing to the fishery.

(T) Denotes total for both Montana and Idaho

**Since data on the number of streams in only 4 of the 10 National Forests in Region 1 is available, the totals for the number of streams in the State and the Planning Area is not an accurate representation.

Source: USDA Forest Service, Region 1, Missoula, Montana, 1977

X

7.32 ASSUMPTIONS FOR TOMORROW

Tables 26, 27, and 28 show projected harvest, licensees afield, hunting success, hunting recreation days, and days hunted per animal harvest for white tailed and mule deer and elk. Tables 29 and 30 show projected supply and demand for trout and other salmonids in lakes and streams. The projections are for Montana Department of Fish and Game Regions 1 and 2, whose boundaries are roughly equivalent to those of the Western Montana Planning Area. The State total represents the sum of all Montana Fish and Game Regions. Region 1 consists of all of Lincoln, Flathead, Sanders, and Lake Counties and parts of Missoula, Powell, and Lewis and Clark Counties. Region 2 is all of Mineral, Ravalli, and Granite Counties and parts of Missoula, Powell, Lewis and Clark, Deer Lodge, and Silver Bow counties (the latter two are not in the Planning Area). Specific assumptions are:

1. Fish and wildlife will be increasingly valued as a visual resource.

2. Protection of unique, threatened, and endangered species habitat will become more important. Court actions with regard to threatened and endangered species will increase.

3. Increased production of commodity resources will place increasing pressure on all fish and wildlife habitat.

4. Continued private land development will result in additional reductions of winter range and other wildlife habitat. As a result, the availability of wildlife habitat on public lands will become increasingly important.

5. Use conflicts between wildlife and motorized recreation will increase.

6. The public will demand more consideration be given to forage for wildlife.

7. Through vegetative manipulation, increased production of some commodity resources will improve habitat for wildlife.

8. People will show increased concern for and interest in all wildlife and their role in ecosystems.

9. Hunting demands for big game will continue to increase.

10. In certain segments of the public, anti-hunting sentiment will increase.

11. Improved access to formerly inaccessible areas will necessitate shorter hunting seasons and additional restrictions on hunting.

12. Protection and improvement of fisheries will continue to increase in importance.

Table 26

CURRENT AND PROPOSED MANAGEMENT PARAMETERS FOR WHITE-TAILED DEER; MONTANA AND MONTANA DEPARTMENT OF FISH AND GAME REGIONS 1 AND 2 (1976-1990) 1/

	White-tailed Deer Harvest 2/	Licensees Afield 3/	% Hunting Success	White-tailed Deer Hunting Recreation Days	Effort (Days Hunted Per White-Tailed Deer Harvested)
1976 State	16,000	43,640	38	308,000	19
Western Mt. 4/	4,500	19,700	22	159,800	37
Region 1	3,300	12,700	26	108,000	32
Region 2	1,200	7,000	18	51,800	42
1980 State	40,000	79,000	50	461,000	11
Western Mt. 4/	8,600	28,400	29	229,000	27
Region 1	6,000	18,000	33	156,000	26
Region 2	2,600	10,400	25	73,000	28
1985 State	40,000	80,000	50	462,000	12
Western Mt. 4/	8,600	31,400	26.5	246,000	29
Region 1	6,000	20,000	30	168,000	28
Region 2	2,600	11,400	23	78,000	30
1990 State	40,000	83,000	48	488,000	12
Western Mt. 4/	8,600	34,200	24	280,000	33
Region 1	6,000	22,000	27	192,000	32
Region 2	2,600	12,200	21	88,000	34

Source: "A Strategic Plan for the Protection, Perpetuation, and Recreational Use of the Fish and Wildlife Resources in Montana," Montana Department of Fish and Game, Helena, Montana, draft document, March 1, 1978, p. 23, 26, and 28.

1/ Deer questionnaire information split on basis of percent of species in harvest.
2/ Includes prorated number of "unidentified" deer reported in harvest.
3/ Total deer licensees x percent white-tailed deer in harvest.
4/ Boundaries of Fish and Game, Regions 1 and 2 correspond closely with the boundaries of the Western Montana Planning Area.

Table 27

CURRENT AND PROPOSED MANAGEMENT PARAMETERS FOR MULE DEER; MONTANA AND MONTANA DEPARTMENT OF FISH AND GAME REGIONS 1 AND 2 (1976-1990) 1/

	Mule Deer Harvest 2/	Licensees Afield 3/	% Hunting Success	Mule Deer Hunting Recreation Days	Effort (Days Hunted Per Mule Deer Harvested)
1976 State	27,000	71,200	38	503,000	19
Western Mt. 1/	3,900	19,500	22	152,200	37
Region 1	1,300	5,000	26	42,000	32
Region 2	2,600	14,500	18	110,200	42
1980 State	58,000	116,000	50	685,000	11
Western Mt. 4/	6,400	23,900	29	176,000	27
Region 1	1,800	5,500	33	47,000	26
Region 2	4,600	18,400	25	129,000	28
1985 State	58,000	120,000	48	730,000	13
Western Mt. 4/	6,400	26,000	26.5	188,000	29
Region 1	1,800	6,000	30	50,000	28
Region 2	4,600	20,000	23	138,000	30
1990 State	58,000	129,000	45	828,000	14
Western Mt. 4/	6,400	28,200	24	213,600	33
Region 1	1,800	6,600	27	57,600	32
Region 2	4,600	21,600	21	156,000	34

Source: A Strategic Plan for the Protection, Perpetuation, and Recreational Use of the Fish and Wildlife Resources in Montana," Montana Department of Fish and Game, Helena, Montana, draft document, March 1, 1978, p. 7, 10, and 12.

1/ Boundaries of Fish and Game Regions 1 and 2 correspond closely with the boundaries of the Western Montana Planning Area.
2/ Deer questionnaire information split on basis of percent of species in harvest.
3/ Includes prorated number of "unidentified" deer in harvest.
4/ Total deer licensees afield x percent mule deer in total harvest.

Table 28

CURRENT AND PROJECTED MANAGEMENT PARAMETERS FOR ELK;
MONTANA AND MONTANA DEPARTMENT OF FISH AND GAME REGIONS 1 AND 2 (1976-1990)

	Elk Harvest	Licensees Afield	% Hunting Success	Elk Hunting Recreation Days	Effort (Days Hunted Per Elk Harvested)
1976 State	7,860	74,190	11	601,064	76
Western Mt. 1/	3,519	36,487	10	287,900	81
Region 1	1,583	14,533	11	121,900	77
Region 2	1,936	21,954	9	166,000	85
1980 State	14,800 2/	93,000 3/	16	700,000	48
Western Mt. 1/	6,700	47,000	13.5	350,000	53
Region 1	2,500	18,200	13	140,000	56
Region 2	4,200	28,800	14	210,000	50
1985 State	14,800 2/	99,000 3/	15	783,000	53
Western Mt. 1/	6,700	51,000	12.5	386,000	58.5
Region 1	2,500	19,900	12	155,000	62
Region 2	4,200	31,100	13	231,000	55
1990 State	14,800 2/	106,000 3/	14	851,000	57
Western Mt. 1/	6,700	54,700	11.5	427,000	65
Region 1	2,500	21,600	11	175,000	70
Region 2	4,200	33,100	12	252,000	60

Source: "A Strategic Plan for the Protection, Perpetuation, and Recreational Use of the Fish and Wildlife Resources in Montana," Montana Department of Fish and Game, Helena, Montana, draft document, March 1, 1978, p. 35, 38, and 39.

1/ The boundaries of Fish and Game Regions 1 and 2 correspond closely with the boundaries of the Western Montana Planning Area.
2/ Not including Yellowstone National Park migratory elk harvestable in late season hunt.
3/ Based on Montana Department of Community Affairs human population projections (mid-range) and 16,000 nonresidents afield statewide.

Table 29

PROJECTED SUPPLY AND DEMAND FOR TROUT, KOKANEE, AND OTHER SALMONIDS IN LAKES; MONTANA AND MONTANA DEPARTMENT OF FISH AND GAME REGIONS 1 AND 2 (1976-1990)

(man-days)

	1976-77		1980-81		1985		1990	
	Supply	Demand	Supply	Demand	Supply	Demand	Supply	Demand
State								
Trout & Kokanee	1,970,000	1,340,600	1,970,000	1,474,800	2,026,000	1,681,500	2,077,000	1,882,900
Other Salmonids 1/		12,300		13,600		16,500		17,500
Western Mt.								
Trout & Kokanee	967,000	504,900	967,000	555,300	967,000	633,000	967,000	709,000
Other Salmonids 1/		4,650		5,100		5,800		6,600
Region 1								
Trout & Kokanee	767,000	351,000	767,000	386,000	767,000	440,000	767,000	493,000
Other Salmonids 1/		3,100		3,400		3,900		4,400
Region 2								
Trout & Kokanee	200,000	153,900	200,000	169,300	200,000	193,000	200,000	216,000
Other Salmonids 1/		1,550		1,700		1,900		2,200

Source: "A Strategic Plan for the Protection, Perpetuation, and Recreational Use of the Fish and Wildlife Resources in Montana," Montana Department of Fish and Game, Helena, Montana, draft document, March 1, 1978, p. 173-185.

1/ Other salmonids include arctic grayling and mountain lake, and pygmy whitefish. Supply of these other salmonids is undertermined.

PROJECTED SUPPLY AND DEMAND FOR TROUT AND OTHER SALMONIDS 1/ IN STREAMS;
MONTANA AND MONTANA DEPARTMENT OF FISH AND GAME REGIONS 1 AND 2; 1976-1990

(man-days)

	1976-77		1980-81		1985		1990	
	Supply	Demand	Supply	Demand	Supply	Demand	Supply	Demand
State								
Trout	1,649,000	1,308,800	1,728,700	1,444,200	1,698,700	1,649,800	1,634,300	1,846,700
Kokanee 2/	33,00	20,500	33,000	22,600	33,000	25,800	33,000	28,900
Whitefish	722,000	126,700	722,000	137,600	722,000	156,800	722,000	175,600
Western Mt. 3/								
Trout	567,400	439,000	600,000	483,200	577,700	550,700	554,700	617,000
Kokanee 4/								
Whitefish	360,000	37,600	360,000	41,300	360,000	47,000	360,000	52,600
Region 1								
Trout	262,400	185,400	273,500	204,200	267,500	232,700	260,000	260,700
Kokanee	33,000	20,500	33,000	22,600	33,000	25,800	33,000	28,900
Whitefish	240,000	12.300	240,000	13,600	240,000	15,400	240,000	17,200
Region 2								
Trout	305,000	253,600	326,500	279,000	310,200	318,000	294,700	356,300
Kokanee 4/								
Whitefish	120,000	25,300	120,000	27,700	120,000	31,600	120,000	35,400

Source: "A Strategic Plan for the Protection, Perpetuation, and Recreational Use of the Fish and Wildlife Resources in Montana," Montana Department of Fish and Game, Helena, Montana, draft document, March 1, 1978, p. 143-156.

1/ Supply and demand for grayling are undetermined.
2/ Plus an undetermined amount on lightly-used areas.
3/ Boundaries of Fish and Game Regions 1 and 2 correspond closely to the boundaries of the Western Montana Planning Area.
4/ Supply and demand for kokanee in Region 2 are undetermined.

RANGE ELEMENT

7.4 RANGE ELEMENT

The mission of the Range System is to enhance production and use of forage for red meat production while minimizing the impact of grazing on wildlife, fish, and recreation resources. The System includes all activities needed to manage, protect, and develop forage on National Forest land. The State and Private Forestry branch of the Forest Service provides assistance to owners of non-Federal forested rangeland through Federal and State agencies, consultants, and others.

7.41 THE AREA TODAY

A. Range Resource and Use by Domestic Livestock: About 70 percent of Montana's total land area is either rangeland or grazable woodlands. 1/ The Area produces more than 250,000 animal unit months (AUM's) of forage each year. Although livestock production is the State's leading industry, it is less important in Western Montana than in other parts of the State. Less than 30 percent (4 million acres) of Western Montana's total land area is rangeland or grazable woodland. Historically, these lands have been overgrazed, and today more than 50 percent of the Area has less than good range conditions. Range condition by county is shown in figure X.5.

There are an estimated 712,000 acres of grazeable National Forest lands within the Planning Area, composed of the following:

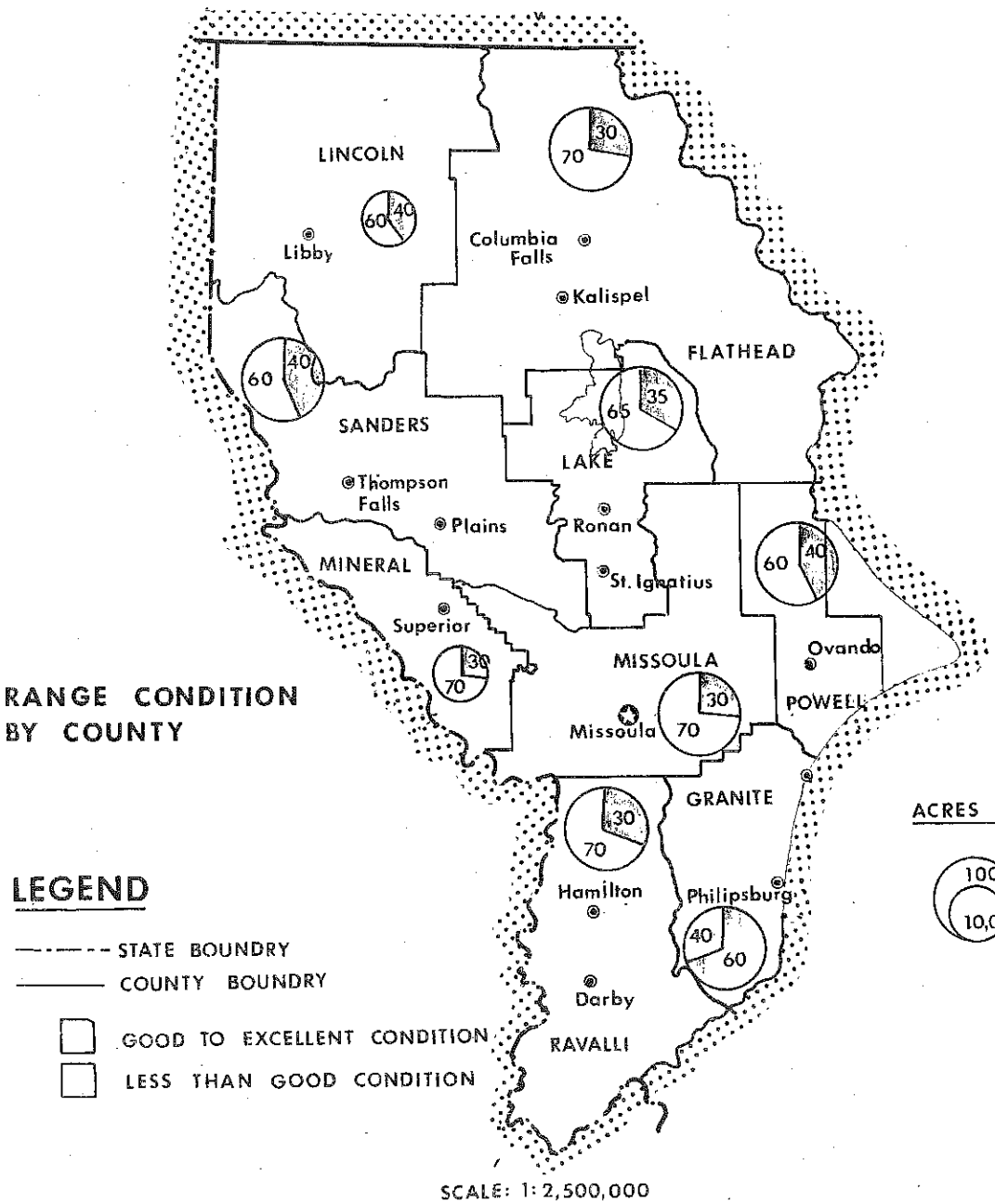
Primary Range --	201,000 acres
Secondary Range --	364,000 acres
Transitory Range --	147,000 acres
TOTAL	712,000 acres

Current domestic livestock use (46,000 AUM's) comes almost entirely from primary and transitory range. Much secondary range is not available for use by livestock due to barriers such as lack of water, the system of range management applied, steep terrain, allocation to other resource uses, etc. Sixty percent of the National Forest rangeland is in good to excellent condition, and 40 percent in fair to poor condition.

All classes of range are considered forested types, which either naturally support a usable grass or brush understory (as in primary and secondary range) or which represent successional grass/brush stages created by wildfire or timber harvest (transitory range). Primary range consists of narrow, rather widely-separated feed areas from 1 to 400 acres in size along stream bottoms. Such areas have high values for other resources (such as water quality, fisheries, recreation). Where other resource uses are important and need to be maintained, less than "proper use" of range is considered the norm. Secondary and transitory ranges generally include smaller stream courses and adjacent hillsides. The potential for conflict with other resources is much less on secondary and transitory than on primary range.

1/ Jackson, Peter V., "Montana Rangeland Resource Program," Department of Natural Resources and Conservation, Conservation Districts Division.

WESTERN MONTANA PLANNING AREA



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B. Vegetative Potential of National Forest Rangeland: Estimates of vegetative potential in Western Montana forests range from 330,000 AUM's to 91,300 AUM's. The high estimate represents AUM's that would be realized under an instituted management system (with controls such as fencing and on-and-off range use) not currently practiced. Thus, the 330,000 AUM's estimate includes areas which may not be managed for livestock grazing. The lower estimate of 91,300 AUM's indicates areas where it would be practical to manage for grazing.

The estimated vegetative potential of primary, secondary, and transitory range in Western Montana National Forests is:

Primary Range: 201,000 acres = 40,200 AUM's

(Estimated stocking rate is 5 acres/AUM, based on Meugglers Mountain Grassland habitat type of Western Montana. This may be an optimistic estimate since most primary range is forested, and not a true grassland type.)

Secondary Range: 364,000 acres = 36,400 AUM's

(Estimated stocking rate is 10 acres/AUM, based on Meugglers Mountain Grassland habitat type for Western Montana and adjusted downward in recognition that these are forested ranges incapable of the amount of production characteristic of a grassland habitat.)

Transitory Range: 147,000 acres = 14,700 AUM's

(Estimated stocking rate is the same as on secondary range. Stocking rate is based on "Grazing Potential on lodgepole pine clearcuts in Montana" (Basite and Jensen), adjusted downward in recognition that this work was conducted in cut-over areas revegetated by abundant forbes and grasses. In Western Montana, revegetation generally consists of less palatable browse and grass species.) (Basite and Jensen, 7 acres/AUM).

Additional grazing potential exists on private land--achieving this potential depends upon improving range conditions through intensive management systems such as rest-rotation, construction of needed range improvements, brush control, fertilization, seeding, and other measures.

Domestic livestock are not the only users of forage produced on National Forest lands; white-tailed deer, mule deer, and elk are also major users of and competitors for available forage. Table 31 summarizes vegetative potential, actual and potential livestock use and estimated use by game in Western Montana National Forests.

Table 31

ACRES OF PRIMARY, SECONDARY, AND TRANSITORY RANGELAND USE BY LIVESTOCK AND WILDLIFE; WESTERN MONTANA PLANNING AREA

Range Class	Acres	Acres/AUM's	Estimated Vegetative Potential AUM's	Not Useable to Livestock AUM's	Estimated Game Use AUM's	Pot. Net Livestock Use AUM's	Act. Livestock Use AUM's
Primary	201,000	5	40,200		6,500	33,700	33,700
Secondary	364,000	10	36,400	18,200	25,200	5,600	
Transitory	147,000	10	14,700		2,400	12,300	12,300
TOTAL	712,000		91,300	18,200	34,100	51,600	46,000

A

Calculations of game use are admittedly crude and probably conservative since these lands receive a higher proportionate share of game use than indicated. National Forests often provide the best lands for grazing by both wildlife and domestic animals.

As indicated in table 31, current forage use by wildlife and livestock accounts for 88 percent of the estimated vegetative potential, with apparent use imbalances occurring on primary and transitory range. Livestock use accounts for 84 percent of vegetative potential on both primary and transitory range; however, the average livestock/game use split is 57 and 43 percent respectively for all range classes. Proportionate use is not occurring because game use of primary and secondary is generally higher than the indicated 6 percent. The result is over-use of forage in some locations.

7.42 ASSUMPTIONS FOR TOMORROW

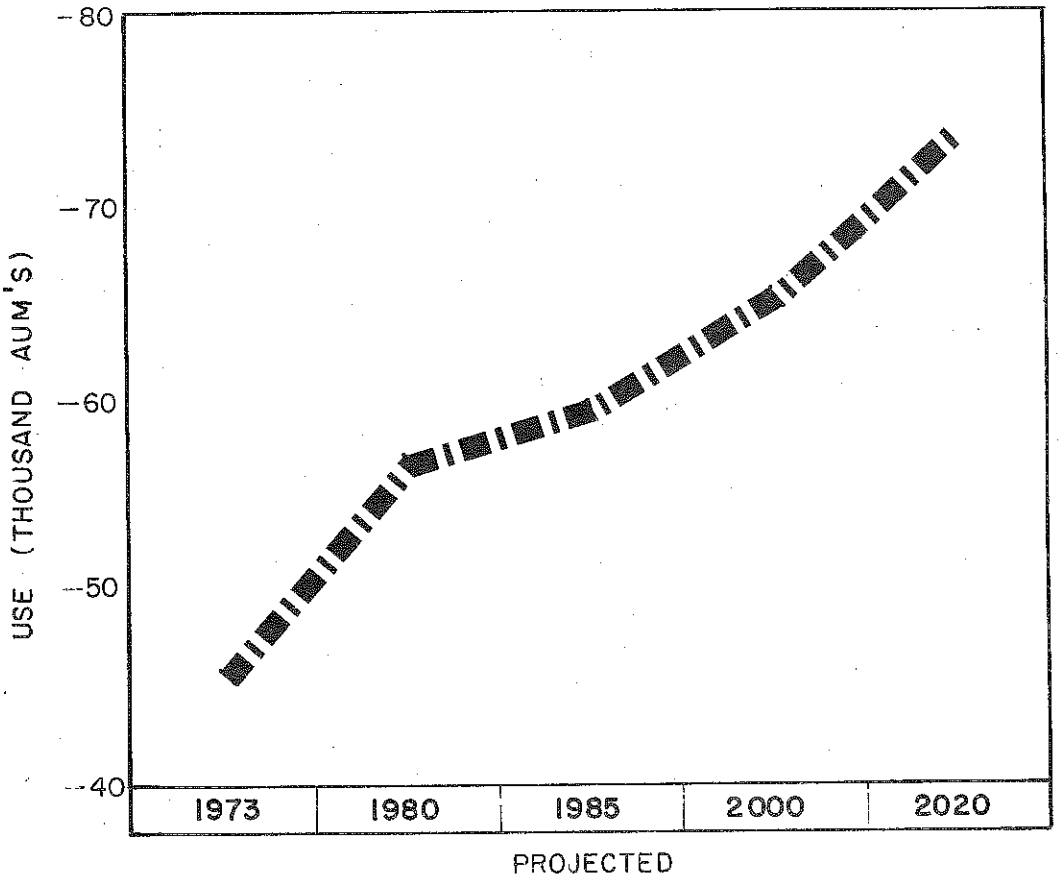
Additional demands for increased livestock forage will either have to be met by forage from private lands or by bringing new National Forest acreage into use through heavy investments in range management systems and range improvements.

Improved management, along with investments in drift fences and water developments could resolve localized overuse problems and will be necessary to maintain the current level of livestock use.

Secondary range needs to be developed, and livestock use shifted to these areas to take the pressure off problem portions of primary range.

Unless improvement measures are undertaken, any large increase in grazing use will result in continuing abuse and deterioration of vegetation and land resources in Western Montana.

PROJECTED FORAGE USE BY LIVESTOCK IN WESTERN MONTANA NATIONAL FORESTS*



* Projections are based on factors derived from OBERS Series E livestock production projections for Water Resources Sub-Area 1702 (Clark Fork River Basin). Projections assume that future livestock demand in Western Montana will be a function of population.

TIMBER ELEMENT

7.5 TIMBER ELEMENT

The primary mission of the Timber System is to help meet the Nation's short-term and long-term timber needs by enhancing timber growth and use of wood and wood products. The System includes activities that contribute to: (1) timber protection, improvement, and growth; (2) timely, efficient timber harvest; and (3) efficient processing of wood and wood-related products.

7.51 THE AREA TODAY

A. Timber Production and Harvest: Sixty-eight percent of commercial timberland in both Montana and the Western Montana Planning Area is Federally-owned. This contrasts markedly with overall ownership of commercial timberlands in the United States; Nationwide, Federal lands account for only 22 percent of the commercial forest base. Farms and miscellaneous private holdings account for nearly 60 percent of commercial forest land in the United States, whereas in the Planning Area these ownerships account for only 18 percent of commercial forests (see table 32).

Nationally, 18 percent of commercial forest acres are administered by the Forest Service, but in Western Montana, 62 percent are under Forest Service jurisdiction. In the Area, miscellaneous private holdings account for the next largest proportion of commercial acres (13 percent), followed by the forest industry (10 percent) and other Federal agencies (6 percent).

National Forest lands generally have greater potential for productivity than do lands of other ownerships. Productive potential on National Forests in the Planning Area is 92 cubic feet/acre/year, while on lands of other ownership it is around 54 cubic feet/acre/year (see table 33). However, the percent of potential growth realized on National Forests in the Planning Area is less than the percent realized on land of other ownerships; in 1970, current growth on National Forest lands was 40 percent of the productive potential, while growth on other ownerships was between 49 and 54 percent of potentials. Net growth on lands of all ownerships was about 44 percent of the potential.

The difference between growth and potential for growth in Western Montana can be attributed to several factors. Most stands in the area are not managed intensively. There is an excess of old growth, and much growth is lost through unsalvaged mortality. Many stands not managed intensively are overstocked. In addition, significant reduction in growth is attributed to insects and disease;

> "this loss occurs primarily in old, unmanaged stands. Once these stands are brought under intensive management, the impact of insects and diseases will decrease. Major insects include bark beetles, such as mountain pine beetle, Douglas-fir beetle, and pine engraver beetle; and defoliators, such as western spruce budworm and larch casebearer. All these insects either are or have been epidemic throughout the planning area. Major diseases include three dwarf mistletoe species-host combinations, root and butt rots, and stem decays."

Table 32

OWNERSHIP OF COMMERCIAL FOREST LAND IN THE UNITED STATES, MONTANA, AND WESTERN MONTANA PLANNING AREA; 1970

Type of Ownership	United States[1/] M acres	%	Montana[2/] M acres	%	Western MT[2/] M acres	%
Federal						
National Forest	86,824[3/]	18	9,600	61	6,175	62
Bureau of Land Mgt.	4,762	1	478	3	155	2
Bureau of Indian Affairs (Trust Land)	5,888	1	620	4	371	4
Other Federal	4,534	1	53	--	3	--
TOTAL Federal	102,008	21	10,698	68	6,704	68
State	21,423	4	530	3	437	4
County & Municipal	7,589	2	5	--	2	--
Forest Industry	67,341	14	1,055	7	1,041	10
Farm	131,135	26	1,952	12	469	5
Miscellaneous Private	165,101	33	1,558	10	1,276	13
TOTAL All Ownerships	494,597	100	15,828	100	9,929	100

1/ RPA - The Nation's Renewable Resources, An Assessment, 1975 - table 8, p. 35.

2/ The Rocky Mtn. Timber Situation, 1970 - USDA, FS, IN 10, 1974 - table 11, p. 38.

3/ Does not include 5.1 million acres classed as "Unregulated" commercial timber land.

Table 33

TIMBER PRODUCTIVITY, GROWTH, AND REMOVAL
UNITED STATES, MONTANA, AND WESTERN MONTANA PLANNING AREA; 1970

(Productivity Classes, Sawtimber Inventory, Net Growth, Removals & Growth/Removal Balance)

UNITED STATES	Ownership 1/		Productivity Class 2/					Net Growth 13/			Softwood Sawtimber Inventory 3/		Net Growth Annual 4/		REMOVALS Harvest 5/		Annual Mortality 6/		Total Insect & D. Fr. 7/	Growth-Removal Balance		
	Area MMAcres	Prop. %	Millions of Acres by Class 165+	120-165	85-120	50-85	20-50	Cubic Ft./Acre/Yr. Current	Potential	% of Poten.	Billions Bd.Ft.	% of Total	Billions Bd. Ft.	Bd. Ft. /Acre	Billions Bd. Ft.	%	Billions Bd. Ft.	% of Harvest	Billions Bd. Ft.	Million Bd. Ft.	Billions Bd. Ft.	Ratio
National Forest	86.8	18	2.9	8.5	17.5	32.7	25.2	30	73	41	982	51	8.6	99	12.5	27	6.0	48	18.5	-3.9	-9.9	.46
Other Public	44.2	9	2.0	3.5	6.0	16.6	16.1	39	68	57	223	12	4.0	90	4.2	9	1.5	36	5.7	-0.2	-1.7	.70
Forest Industry	67.3	14	4.1	8.0	18.8	24.9	11.4	52	83	63	318	17	10.0	149	16.4	35	1.8	11	18.2	-6.4	-8.2	.55
Farm & Misc. Private	296.2	59	4.5	18.0	73.8	121.2	78.8	36	72	50	382	20	17.7	60	13.8	29	2.1	15	15.9	+3.9	+1.8	1.11
Total (All Ownerships)	494.6	100	13.5	38.1	116.2	195.4	131.4	38	74	51	1905	100	40.3	81	46.9	100	11.3	24	58.7	-6.6	-17.9	.69
MONTANA	MAcres	7/	Thousands of Acres by Class				8/			10/	Millions Bd.Ft.	9/	Millions Bd. Ft.	10/	Millions Bd. Ft.	11/	Millions Bd. Ft.	12/	Millions Bd. Fc.	Millions Bd. Ft.	Millions Bd. Ft.	
National Forest	9600	61	198	1436	3633	2774	1560	30	86	35	64,748	64	925	96	654	60	365	56	1019	+271	-94	.91
Other Public	1686	11	7	16	82	522	1059	24	46	52	9,219	9	146	87	96	9	53	55	149	+50	-3	.96
Forest Industry	1055	7	8	18	122	474	433	27	55	49	9,526	9	130	123	289	26	57	20	346	-159	-216	.38
Farm & Misc. Private	3510	22	12	27	126	1032	2314	24	46	52	17,432	17	273	78	53	5	103	194	156	+220	+117	1.75
Total (All Ownerships)	15851	100	225	1497	3963	4802	5366	28	70	40	100,926	100	1473	93	1093	100	578	53	1671	+380	-198	.88
WESTERN MONTANA		7/					8/			10/		9/										
National Forest	6175	62	183	1181	2594	1346	872	37	92	40	46,288	64	738	120	582	60	293	50	875	+156	-137	.64
Other Public	969	10	7	16	82	395	470	28	53	53	6,356	9	113	117	85	9	28	33	113	+28	±0	1.00
Forest Industry	1041	10	8	18	122	473	419	27	55	49	9,500	13	129	124	257	26	57	22	314	-128	-185	.41
Farm & Misc. Private	1744	18	12	27	126	716	864	29	54	50	10,233	14	193	111	47	5	41	87	88	+146	+105	2.19
Total (All Ownerships)	9929	100	210	1242	2924	2930	2625	34	77	44	72,377	100	1173	118	970	100	419	43	1389	+202	-216	.84

1/ RPA - The Nation's Renewable Resources - An Assessment, 1975, P. 246.
2/ The Outlook for Timber in the United States, USDA, 10/73, Table 5, P. 238.
3/ RPA - The Nation's Renewable Resources - An Assessment, 1975, P. 250.
4/ The Outlook for Timber in the United States, USDA, 10/73, Table 22, P. 275.
5/ The Outlook for Timber in the United States, USDA, 10/73, P. 261.
6/ The Outlook for Timber in the United States, USDA, 10/73, Table 27, P. 283.
7/ The Rocky Mtn. Timber Situation, 1970 - USDA - INT 10, 1974 - Table 11, P. 38.
8/ The Rocky Mtn. Timber Situation, 1970 - USDA - INT 10, 1974 - Tables 15 & 16.
9/ Ibid - Table 25, P. 62.
10/ Ibid - Table 49, P. 75.
11/ Ibid - Table 53, P. 77, and Montana Timber Harvest - USFS, S&PF, RI - 9/15/72 - Unpublished.
12/ Ibid - Table 51, P. 76.
13/ RPA - The Nation's Renewable Resources - An Assessment, 1975 - P. 254.

Data collected for the 1975 RPA Assessment showed 72 billion board feet of softwood sawtimber in Western Montana in 1970 (see table 33). The Assessment showed softwood sawtimber distributed proportionally among various ownerships in the Planning Area. In contrast, with only 18 percent of commercial forests in the United States in National Forests, the National Forests accounted for 51 percent of the Nation's total sawtimber inventory in 1970.

Table 33 shows that harvest from the Planning Area was disproportionate to ownership. In 1970, forest industry-owned lands (which comprise 10 percent of the commercial forest base) accounted for 26 percent of the Area's harvest and farm and miscellaneous holdings (18 percent of the commercial base) accounted for only 5 percent of harvest. Harvest from all Federal lands in Western Montana was nearly proportional to their combined share of the Area's commercial base.

Annual mortality in the Area is high. On lands of all ownership it amounted to approximately 420 million board feet in 1970, which was equivalent to 43 percent of the total harvested volume. Nationally, about 7 percent of the estimated annual mortality was salvaged. 1/ Salvage statistics for the Planning Area are not available; however, due to poor access, salvage may be no more than 3 to 4 percent.

Considering all ownerships in Western Montana, removals (harvest + mortality) exceed net growth by 216 million board feet in 1970. The growth-removal ratio was $\frac{84 \text{ net growth}}{100 \text{ removals}} = 84$. In other words, for every 84 board feet of net growth, 100 board feet were removed through harvest or mortality. The ratio for industry was .41; for National Forests, .84. Farm and miscellaneous private holdings showed a positive growth-removal ratio of 2.19, and growth and removal on other public lands were balanced.

The growth-removal ratio on farm and miscellaneous private holdings indicates these lands could provide an increasing share of the Area's timber harvest. A 1974 study 2/ showed that, in Western Montana, about 250,000 acres on the fringes of cities and towns have been subdivided. This figure excludes tracts over 40 acres in size. Suburban tract acreage increased 23 percent annually from 1963 to 1973. Approximately one-half of surburban acreage is on forested lands.

Table 34 shows volumes of timber harvested from Montana and Western Montana [redacted] between 1969 and 1976. While total harvest has remained relatively stable (an average 1.1 billion board feet annually), harvest from National Forests has shown a slight, but steady decline. In the State, harvest from private lands increased 57 percent, while harvest from Federal lands declined 41 percent between 1969 and 1976. A similar trend is seen in the Planning Area. Most of this decline is occurring on National Forest land. Expressed as a percentage of the total, private contributions to total Montana harvest have increased steadily from 28 percent in 1969 to 51 percent in 1976.

1/ "The Outlook for Timber in the United States," USDA Forest Service, 1973, p. 19.
2/ Montana Land Use Policy Study, p. 20-25.

Table 34

MONTANA TIMBER HARVEST; CY 1969-1976
(All Sources - Millions of Board Feet)

Ownership	Calendar Year															
	1969		1970		1971		1972		1973		1974		1975		1976	
	Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%	Vol.	%
National Forest Montana[1/]	800	61	654	60	739	59	558	51	564	50	495	45	445	45	470	42
Western Montana	(683)		(557)		(631)		(493)		(460)		(437)		(394)		(424)	
BIA (Trust Lands)[2/]	79	6	56	5	76	6	83	8	98	9	83	8	44	4	59	5
BLM[2/]	15	1	12	1	5	-	4	-	3	-	3	-	5	1	4	-
TOTAL Federal	894		722		820		645		665		581		494		533	
State[2/]	47	4	28	3	22	2	32	3	23	2	8	1	5	1	19	2
Private (All)[2/]	362	28	343	31	402	32	407	38	429	38	499	46	501	50	570	51
Forest Industry[3/]			(289)		(339)		(343)		(362)		(421)		(422)		(481)	
TOTAL (All Ownerships)	1303	100	1093	100	1243	99	1084	100	1117	99	1088	100	1000	101	1122	100

1/ USDA Forest Service, Northern Region, "Timber Cut by Species."

2/ USDA Forest Service, Northern Region, State and Private Forestry, May 1975.

3/ The only available statistics that break out forest-industry harvest from total harvest from private lands are from the census year 1970. Projections for 1971 through 1976 are based on the assumption that, in relation to total harvest from private lands, the proportion harvested from industry-owned lands will remain the same.

Most of the increased harvest from private lands has come from industry-owned lands. If harvest assumptions in table 34 are accurate, harvest from industry-owned lands increased 66 percent during the 7-year period, and accounted for 26 percent of total Montana harvest in 1970 and for 43 percent in 1976. Reduced harvest from other public holdings and tribal lands administered by the Bureau of Indian Affairs reflects adjustments in the annual allowable harvest (BLM, -9 million board feet, 1979-71 1/; the State, -5 million board feet, 1975-76 2/; and BIA, -36 million board feet 1974-75 3/).

As of 1973, allowable harvest from National Forests in the State was 969 million board feet; 4/ however, actual sell has been substantially below the allowable cut. This is largely because there is a moratorium on entry into remaining roadless areas until their allocation is addressed through the RARE II process or in environmental statements.

Table 35 shows that, in Western Montana, acreage in timber-producing components (i.e., the standard, special, and marginal components as described in Forest Timber Management Plans) have declined by 24 percent (about 1.4 million acres) since 1970. Distribution of acres to other categories is show below:

Water/ non-forest / unproductive	+246,000 acres
Unregulated	+688,000 acres
Productive Reserved	+199,000 acres
Productive Deferred	+238,000 acres
TOTAL	+1,371,000 acres

Acres of primary timber-producing lands (standard and special components) have decreased approximately 63 percent since 1970. Future timber harvests and timber management activities will primarily be focused on these acres. An additional 778,000 acres is available for harvest from the marginal component if technology can be developed to access and remove the timber.

B. Timber Productivity by Subseries Groups: The subseries groups (discussed in Section 6.2, Biological Systems) indicate timber productivity and give an idea of what management prescriptions should be considered for a particular area.

1/ A Descriptive Analysis of Montana's Forest Resource, USDA Forest Service Resource Bulletin INT-11, 1975, p. 33.
2/ Bureau of Indian Affairs Timber Management Plan for 1975, Flathead Indian Reservation.
3/ Communication with State Forestry Division, Montana Department of Natural Resources, June 1977.
4/ Schweitzer, D. and R. Bensen, "A Descriptive Analysis of Montana's Forest Resources," USDA Forest Service, Ogden, Utah, 1975.

Table 35

TRENDS IN TIMBER LAND USE CATEGORIES
WESTERN MONTANA PLANNING AREA - NATIONAL FOREST LANDS

Land Use Category	Thousands of Acres		
	1970	1973	1977[1/]
Water, Non-Forest, & Unproductive	1,7992[2/]	1,7992[2/]	2,045
Standard	5,209	3,719[2/]	2,434
Special	579	336[2/]	1,202
Marginal	--	852[2/]	778
Unregulated	68[3/]	671[2/]	756
Productive--Reserved	523[4/]	586[5/]	722
Productive--Deferred	100[3/]	315[6/]	338
TOTAL	8,278	8,278	8,278

1/ Preliminary information from all Western Montana Forest timber management planners about Timber Land Use Classifications for new Timber Management Plans, June 1977.

2/ "Land Use Classification," June 1973, R-1, Unpublished data.

3/ The Rocky Mtn. Timber Situation, 1970, Table 10, p. 37.

4/ "Wilderness & Scenic Areas," 1970 "Timber Land Use Classification, R-1," June 30, 1973, Unpublished data.

5/ Scapegoat Wilderness added to Wilderness System, 1972.

6/ RARE File Printouts December 1972.

1. In subseries Group 1 (characterized by open-grown ponderosa pine or Douglas-fir), timber productivity is low, averaging about 30 cubic feet per acre per year with intensive management. Typically, social or biological constraints, as well as economic constraints, preclude intensive timber management. Normally, these stands are managed extensively, using either a selection or a sanitation-salvage timber-cutting prescription. With extensive management, timber yields may be as low as 10 cubic feet/acre/year.

2. Group 2 stands (Douglas-fir and ponderosa pine at lower elevations, with lodgepole pine on some north slopes) have moderate to moderately high timber productivity. Yields average 70 cubic feet/acre/year under intensive management. This group contains some of the best sites for growing ponderosa pine. Without stocking control, timber yields average about 20 cubic feet per acre per year. Regeneration can be a problem in this group because of ground cover competition, and extensive site preparation is normally required. Cutting systems generally recommended are shelterwood or group selection, with clearcutting reserved for the moister sites.

3. Timber Productivity in Group 3 (dominated by Douglas-fir, with significant amounts of lodgepole pine and grand fir in some stands) is similar to productivity in Group 2. Average yields are 70 cubic feet per acre per year with intensive management and 20 cubic feet per acre with extensive management. Group selection or shelterwood cutting systems are normally preferred. Regeneration problems are similar to problems encountered with Group 2. Because this group is common on cool, dry sites, there is less opportunity for use of fire in management activities.

4. Timber productivity in Group 4 (characterized by essentially pure lodgepole pine stands) is variable, but averages about 55 cubic feet/acre/year with intensive and 15 cubic feet/acre/year with extensive management. Low site quality and/or economic constraints often dictate extensive management of lodgepole pine and clearcutting represents the major silvicultural system employed in this group. Catastrophic wildfires are a serious threat to stands in this group, and timber management activities are often undertaken to alleviate this risk.

5. Group 5 contains some of the best timber-producing stands in the Planning Area. Stand composition varies from pure spruce to mixtures of lodgepole pine, Douglas-fir, larch, grand fir, cedar, and hemlock. Average timber production is 115 cubic feet/acre/year; extensive management can produce 45 cubic feet/acre/year. All silvicultural systems can be applied to this group. Stand condition determines which system will be used. Site preparation needs are minimal and natural regeneration is normally good.

6. Potential timber yields in Group 6 (consisting of various mixtures of Douglas-fir, lodgepole pine, larch, subalpine fir, and spruce)

average 110 cubic feet/acre/year with intensive and about 40 cubic feet/acre/year with extensive management. The group rates high in terms of timber production, and all silvicultural systems can be applied. Stand needs dictate which system will be most effective. Brush competition may be a problem with regeneration of stands in this group. Prescribed burning may be difficult because of wet fuels.

7. Group 7 stands consist primarily of various mixtures of subalpine fir, spruce, Douglas-fir, and lodgepole pine. Although average timber production potential for this group is about 110 cubic feet/acre/year, management constraints and the presence of special treatment zones will probably preclude reaching this level of production in the future. Extensive management may be required, along with silvicultural systems limited to selection and sanitation-salvage. Extensive management produces about 40 cubic feet/acre/year.

8. Timber productivity in Group 8 (consisting primarily of lodgepole pine at lower elevations and whitebark pine and subalpine fir at higher elevations) is low--about 20 to 35 cubic feet/acre/year. The group is generally submarginal to marginal for timber management; thus, timber harvest is normally conducted for objectives other than timber production. Opportunities are available for selection or sanitation-salvage cutting along existing roads.

C. State and Private Forestry [redacted] Programs: The State and Private Forestry Arm of the Forest Service is involved in many programs related to timber management and utilization.

1. Resource Utilization: The Division of Forestry, Montana Department of Natural Resources and Conservation is the lead agency in the Cooperative Forest Management Program (CFM). In one aspect of this program, the Forest Service provides technical assistance for resource utilization. The Resource Utilization Program is directed toward extending the supply of timber resources through more efficient and complete use of forest products. Technical assistance is provided in harvesting, primary and secondary processing, and marketing. Emphasis is placed on making use of wood residues, low-grade trees, and little-used species, and on using a greater proportion of the whole tree so that losses incurred in harvest and processing are reduced.

2. Forestry Incentives Program (FIP): This program is directed toward the production of future supplies of wood products. Through the Agricultural Stabilization and Conservation Commission, cost-share funds are made available to private land owners for reforestation and timber stand improvement.

3. CM-4: This program for cooperative production and distribution of forest tree planting stock was authorized by the 1924 Clark McNary Act

(Sec. IV). Known as CM-4, the program encourages states to produce, purchase, and distribute seed and seedlings for reforestation and wind-barrier plantings. Commercial nurserymen may also receive technical assistance through CM-4. No ornamental trees are produced under this program.

4. Title IV of the 1956 Agricultural Act: This legislation authorized assistance to states for tree planting and reforestation. The program aids the state and private forest landowners in planting and reforestation. Emphasis is placed on genetic improvement to develop fast-growing trees that resist insect and disease attacks.

5. General Forestry Assistance: Through this program, funding is provided for a variety of forestry projects which complement the functional cooperative programs listed above.

6. Forest Insect and Disease Management: The Forest Pest Control Act of 1947 provides for cooperation among the Forest Service, other federal agencies, and states to reduce tree losses from insects and diseases. This is done through prevention, detection, evaluation, and suppression activities on lands of all ownerships.

7.52 ASSUMPTIONS FOR TOMORROW

1. The forest industry will continue accelerating conversion from old, slow-growth stands to young, fast-growing stands.

2. Assuming the 1976 harvest level will be maintained in the future, old growth sawtimber inventories on forest industry lands will be liquidated in about 2 decades. Accelerating annual harvest in accordance with trends (shown in table 3), would mean faster liquidation, possibly in little more than one decade.

3. In the short-term (1 to 2 decades), the ability to maintain current production of wood products (about 1.0 billion board feet annually) will depend increasingly on ownerships other than the forest industry.

Within 1 to 2 decades, removals from forest industry-owned lands should approximate growth--or about 100 million board feet per year. This means that about 900 million board feet would have to come from lands of other ownerships. Harvest from farm and miscellaneous private holdings will probably stabilize at about 50 million board-feet annually. Distribution of the remaining 850 million board feet can be estimated for all other public holdings and tribal lands on the basis of reported allowable harvest; (i.e., BLM-2 million board feet (1973); State-25 million board feet (1977); BIA 54 million board feet (1975). With this type of analysis, 769 million board feet would need to be harvested from National Forests.

4. To achieve and maintain annual harvest approaching 760 million board feet from National Forests, large investments in intensive forest practices will be necessary. This is due to reductions in the commercial forest base since 1970, along with significant changes in the timber-producing components (standard, special, and marginal). Measures needed include:

a. Rapid reforestation of the 185,000 acres of non-stocked lands.

b. Acceleration of precommercial thinning on about 800,000 acres of timber stands that are in the 0-40 year age bracket.

c. Rapid completion of the transportation system to increase opportunities for salvaging current mortality. (Current mortality is 293 million board feet annually, which is equivalent to about 50 percent of the annual harvest from National Forests in the Area.)

d. Commercial thinning or other intermediate harvests where future benefits would accrue from larger diameter trees.

e. Technological advances to permit harvest in the marginal components.

5. If current management levels prevail in the future, total production from all ownerships will decline in the short-run. Maintaining current production levels will require significant capital investment in road construction, reforestation, and timber stand improvement (such as precommercial and commercial thinning).

6. Farm and miscellaneous private holdings cannot be relied upon to provide significant increases in harvest levels.

7. On Federal lands, growth that approaches potential cannot be accomplished in the short term. Due to the preponderance of old growth and the poor distribution of age classes, conversion to fast-growing, young stands will require more than 100 years. This amount of time will be necessary to assure both short- and long-term continuing flows of raw materials to wood products manufacturing firms.

8. The annual mortality situation suggests a real need for some "preventive medicine", such as a more extensive salvage program and/or a program that would substitute net growth for mortality through conversion of mortality-susceptible old growth stands to fast growing, thrifty young stands. In addition, the salvage of dead material deserves increased attention for several reasons. It would: 1) help bring net growth and total removals into balance; 2) allow for increased raw material supplies without reducing growing stock inventory; and 3) help compensate for the dwindling land base available for timber production. Pending resolution of roadless land allocation, salvage is probably the most important factor in maintaining wood supplies from the Area's National Forests. By increasing salvage of annual mortality from an estimated 3 percent (current) to 15 percent, an additional 35 million board feet could be harvested from National Forest lands and 15 million board feet from other ownerships.

9. Maintaining current harvest levels of about 1.0 billion board feet will require steadily-increasing removals from National Forest lands--from the current 424 million board feet up to approximately 770 million board feet by 1995.

10. The National Forest Management Act, which, in most cases, requires a non-declining even flow of timber from National Forests, may preclude the Forest Service's ability to achieve the levels of accelerated harvests mentioned above. The 1995 RPA allowable harvest target for the Western Montana Planning Area is about 710 million board feet, or about 92 percent of the projected amount needed to maintain the current level of harvest from National Forests in the Area. This 710 million board feet includes 98 percent of potential yield in the standard component, and 95 percent and 38 percent respectively for special and marginal components. If

these harvest targets are met, it would appear that raw materials supply can at least be maintained during the next 20 years using timber from all ownerships. Ability to make upward adjustments of harvest targets appears doubtful.

11. Wood fiber use in Montana is projected to decline until the year 2,000 and then level off (see figure 7).

12. The application of Federal-State-Private cooperative programs is essential to maintaining a high-quality supply of natural resources from private lands.

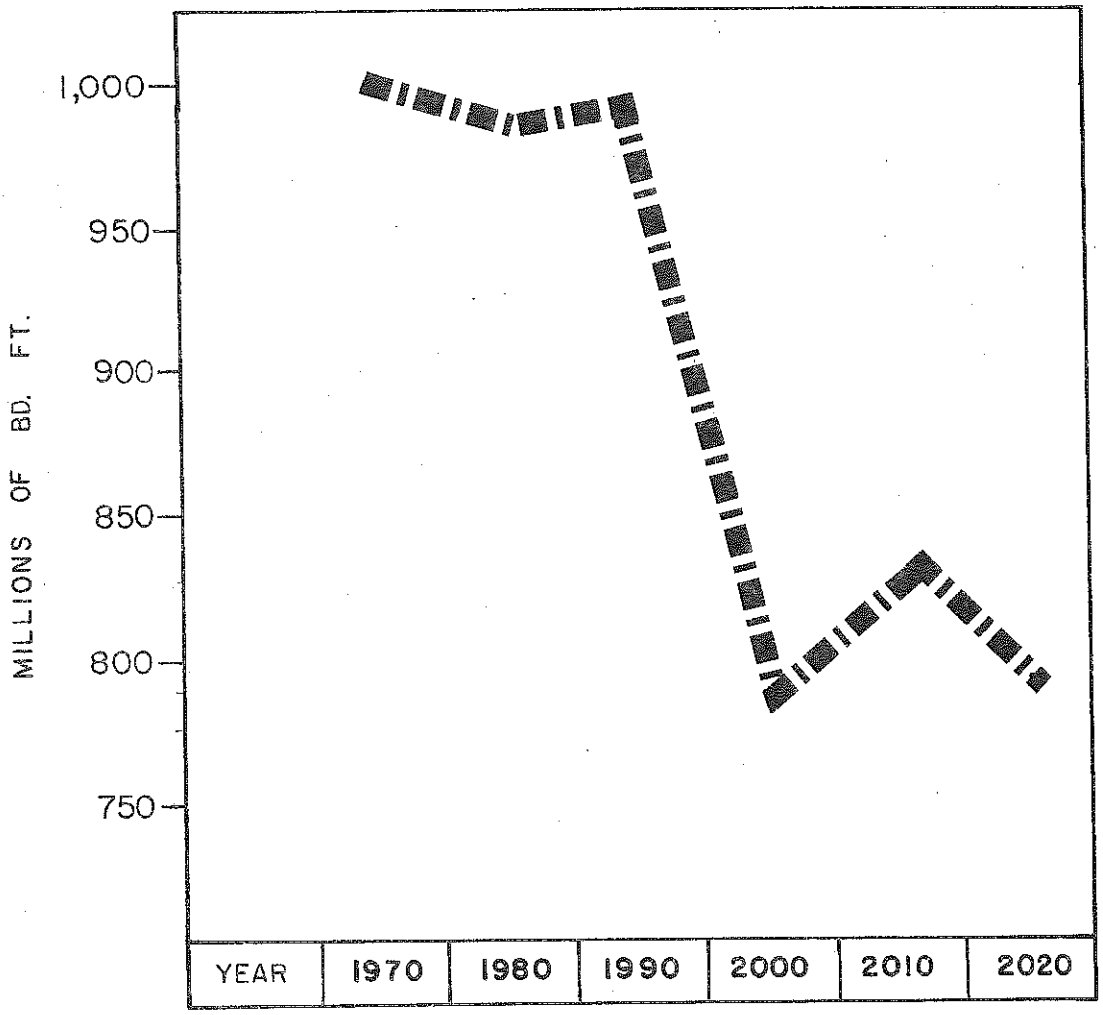
13. As demands for goods and services from private lands continue to increase, there will be a need for more technical forestry assists to carry out cooperative programs, such as CFM, FIP, and Title IV.

14. Aggressive management of insects and diseases can reduce impact by about a cubic foot volume equal to that currently harvested within the plan area. Two examples:

a. The mountain pine beetle kills large numbers of ponderosa and lodgepole pine in older, more dense stands with larger average diameters. Management of the beetle will reduce the amount of tree killing and volume loss. Stands are rated for susceptibility to beetle attack, and the beetle-preferred trees are removed. This not only reduces mountain pine beetle-caused mortality, but also improves growing conditions and "beetle-proofs" the stand.

b. Dwarf mistletoe-infested lodgepole pine, Douglas-fir, and western larch stands produce only a fraction of the potential volume of comparable healthy stands. The dwarf mistletoes are obligate parasites and are destroyed by removal of infested host parts. Incidence of dwarf mistletoes and damage resulting from them can be reduced by removing infected trees as part of silvicultural management.

PROJECTED WOOD FIBER USE MONTANA *



* Projections are based on supply and demand relationships, costs of removal, markets, etc.

WATER ELEMENT

7.6 WATER ELEMENT

The primary mission of the Water Element is to protect, conserve, and enhance water resources on National Forest and rangeland in a manner consistent with other resource values. The Element includes watershed and river basin planning and development in cooperation with State and other agencies. Activities are designed to further knowledge about the water resource.

7.61 THE AREA TODAY

The Clark Fork and Kootenai Rivers are the major drainage systems in the Planning Area. The Clark Fork has a mean annual discharge of about 20,900 cubic feet per second (c.f.s.), with discharges ranging from 11,300 to 30,100 c.f.s. Average mean discharge of the Kootenai River is about 13,300 c.f.s., with discharges ranging from 9,200 to 18,900 c.f.s.

A. Water Uses:

1. Hydroelectric Power: Six major power development sites in the Planning Area have generating capacities exceeding 5,000 kilowatts (see table 36). In addition, there are 12 inventoried dam sites with potential for development (see table 37); three of these sites are along potential Wild Rivers and cannot be developed until the rivers' classification is determined. The sites are Glacier View, Smokey Range, and Spruce Park.

In a treaty dealing with the international cooperative development of the Columbia water resource, Canada retained certain diversion rights for that portion of the Kootenai flowing through Canada. If the Kootenai were to be diverted in Canada, it would affect the production of hydroelectric power on the Kootenai in the United States.

2. Flood Control: Major flooding occurs on the Kootenai River in May and June as warm weather melts heavy mountain snowpacks. Fed steadily by snowmelt, Kootenai River floods sometimes persist as long as 30 days. Flooding along the Clark Fork is also a result of snowmelt, occassionally augmented by rainfall. Rainfall alone does not normally cause flooding in the Area, except in tributaries exposed to local, high-intensity storms.

Four major reservoirs in the Planning Area are regulated for flood control on a forecast basis--Hungry Horse, Libby, and Noxon Reservoirs, and Flathead Lake. These 4 reservoirs have a combined flood-control storage capacity of about 9.4 million acre-feet. Although Flathead Lake has a flood control storage capacity of about 1.2 million acre-feet, it is of only limited use for flood control. Constrictions in the outlet channel between the lake and Kerr Dam limit outflow and cause the lake to fill during the early part of the flood season. An additional 39,000 acre-feet of flood-storage capacity are provided by about 1,600 farm ponds and small reservoirs scattered throughout the Area. They are primarily useful in reducing the frequency of floods along tributary streams.

Table 36

HYDROELECTRIC DAMS WITH GENERATING CAPACITY EXCEEDING 5,000 KILOWATTS; WESTERN MONTANA PLANNING AREA

Dam (existing or under construction)	River System
Hungry Horse	S. Fork Flathead
Kerr	Flathead
Thompson Falls	Clark Fork
Noxon Rapids	Clark Fork
Cabinet Gorge	Clark Fork
Libby	Kootenai

Table 37

INVENTORIED DAM SITES WITH POTENTIAL TO BE DEVELOPED FOR HYDROPOWER PRODUCTION; WESTERN MONTANA PLANNING AREA

Potential Dam Site	River System
Glacier View	N. Fork Flathead
Smoky Range	N. Fork Flathead
Spruce Park	Middle Fork Flathead
Libby Reregulating	Kootenai
Kootenai Falls	Kootenai
Buffalo Rapids No. 2	Flathead
Sloan Bridge	Flathead
Buffalo Rapids No. 4	Flathead
Knowles	Flathead
Ninemile Prairie	Blackfoot
Quartz Creek	Clark Fork
Paradise	Clark Fork

3. Irrigation: Irrigation developments in Western Montana are generally concentrated in the Flathead, Upper Clark Fork, and Bitterroot River Valleys. In the Flathead, 153,000 acres are irrigated, including 114,000 acres irrigated by the Flathead Irrigation Project. There are about 111,000 irrigated acres in the Upper Clark Fork Valley, and about 109,000 irrigated acres in the Bitterroot Valley. Smaller irrigated areas are scattered throughout the Kootenai and Lower Clark Fork Valleys--29,000 acres in the Lower Clark Fork and 8,000 in the Kootenai. Of the total irrigated acreage, about 82 percent is used for production of livestock forage, with the remaining 18 percent used for production of grain, sugar beets, potatoes, and fruits.

Surface water diversions supply about 1.7 million acre-feet for 220,000 acres on which there is an adequate supply of water for irrigation, and for 175,000 acres where the supply is inadequate. About 15,000 acres are irrigated from groundwater sources and are considered adequately supplied. With the exception of the 114,000 acres irrigated by the Flathead Irrigation Project, all of the developments are private projects.

4. Municipal and Industrial: In 1965, municipal, major industrial, and rural water requirements in the Planning Area were about 70 million gallons per day. The wood products industry and pulp and paper mills were the principal industrial water-users. Their needs are consistent throughout the year and are generally met by surface waters. Municipal water use peaks in July.

B. Water Quality: Degredation of water quality has generally resulted from human activities. The most severe impacts to water quality usually occur in urban-industrialized areas, and the least severe impacts in mountainous areas where there has been minimal development--such as in Western Montana. Water quality in the Planning Area is generally excellent for most uses.

Not all adverse impacts are man-caused. Wildfire, high-intensity summer rainstorms and other climatic events, and creeping, slumping, and debris avalanches on unstable soils can also affect water quality. Some areas are seismically or geochemically active; although activities in such areas occurs over short periods of time, impacts may last for years as lands and waters seek a new equilibrium. Even as equilibrium is reached, it does not remain because natural systems are constantly changing.

1. Sedimentation: Sediment concentrations are proportional to the volume of stream flow; i.e., the higher concentrations occur during highest flows. In the Northern Rocky Mountains, streamflow peaks in late spring or very early summer when mountain snowpacks melt. Concentrations are greatest in the initial stage of runoff due to the first flush of sediment accumulations from the preceding runoff season. Lowest sediment concentrations accompany the lowest flows of the year, which occur during fall and winter after snowmelt and when the flow is sustained by groundwater sources.

In the mountains, sediment sources are limited and streambank vegetation and rocks in streams reduce sediment concentrations. Concentrations increase downstream where the stream broadens along flood plains and flows in a channel of much smaller particles. The channel, which is sand and gravel rather than rocks, itself becomes a major source of sediment because the smaller particles are much more easily detached and transported than are rocks.

The highest sediment concentrations in the Planning Area occur from the Jocko River drainage west to Plains. Heavy concentrations here may be due to irrigation in the Jocko River Valley and along the Flathead River flood plain and alluvial terraces. Roads are a major source of excess sediment in streams, regardless of their location--mountains or plains.

2. Dissolved Oxygen: Streams in mountains are normally well aerated (i.e., contain high levels of dissolved oxygen) because they tumble through rocky channels and are fast moving. In the mountains, there are relatively few chemicals placing oxidizing demands on streams. As streams issue forth from the mountains onto the valley floors, the channel is less steep; flows become sluggish and dissolved oxygen contents decrease. Normally, few problems result from decreasing dissolved oxygen levels until oxygen-demanding wastes are introduced to the water. In Western Montana, Ashley Creek below Kalispell is a problem area due to the addition of sewage treatment wastes. These decomposing wastes deplete the water's oxygen concentrations to extremely low levels during summer low flows.

The oxygen regime of lakes and reservoirs differs from that of streams. Lakes stratify and only the upper layer is well oxygenated. The lower layers may be completely deoxygenated because the water only rarely reaches the surface to mix with the air and surface water currents.

3. Bacterial Concentrations: The bacterial concentration of the Area's waters is highly variable. In mountainous areas, bacterial concentration is generally low, although it increases sharply in places where people or livestock congregate. The principal source of bacterial contamination in water is warm-blooded animal waste from feedlots, sewage treatment plants, and septic systems. Discharges of these wastes is particularly serious if the water is used for municipal and domestic (drinking) purposes without being treated. Contamination by these wastes may preclude some nonconsumptive water uses, such as recreation.

4. Chemical Concentrations: In mineralized areas where mining is or was active, the release of chemical ions into surface waters elevates the concentration level of the released ions above the normal level. Localized problems of this nature occur in parts of Western Montana where there has been mineral development--for instance, near the headwaters of the Blackfoot River and along the Clark Fork above Drummond.

5. Impact of National Forest Management Activities on Water Quality: Of all National Forest management activities, timber harvest and road construction have the most detrimental impacts on water quality; both activities result in sedimentation. Forest Service regulations for timber sale contracts include restrictions designed to minimize sedimentation from logging. Other activities, such as use of roads and recreation use at resorts and near lakes and streams, also affect water quality.

Because the State and counties have primary responsibility for monitoring water quality, there is no overall monitoring system for the National Forests. However, the Forest Service does monitor water quality in various critical areas--primarily in major recreation areas and in watersheds where timber sales are planned.

X

7.62 ASSUMPTIONS FOR TOMORROW

1. The principal factors that determine future water needs are population changes and industrial expansion.

a. Production growth of the major water-using industries (wood products and primary metals) is projected to increase by 350% by year 2020.

b. Present municipal water requirements ar expected to increase from the present use of 25 million gal./day to about 49 million gal./day by 2020.

c. While the steadily mounting needs for water will not strain the abundant water resources in the area, localized supply difficulties are certain to emerge for municipal water. In those areas that use gound-water for domestic purposes, contamination will continue to be a problem.

2. Projected estimates are that about 300,000 acres of the potential irrigable land will [illegible] by 2020, ~~for~~ a total of 710,000 acres under irrigation.

with

need to be irrigated

3. With the present energy crisis expected to continue, ~~into the future,~~ potential power generation sites will be continually evaluated for feasibility, both economic and environmental. If development of these sites results, many more miles of electrical transmission lines will be required.

MINERALS ELEMENT

7.7 MINERALS ELEMENT

7.71 The Area Today

Energy resources and mineral deposits are unique, highly valuable features of the earth's crust, formed after the earth evolved by slow processes still active today. Minerals and energy commodities are used in every aspect of daily living. Metals are used to build machines, appliances, and buildings; food is grown with mineral fertilizers; synthetic fibers in our clothing are derived from coal and petroleum products. The list is endless. Consumption of large quantities of mineral and energy resources is essential to the development of industrial nations. Since mineral and energy resources form over a long period of time (millions of years) only under special conditions, reserves are limited.

The United States economy is dependent upon mineral and energy commodities. Currently identified domestic mineral and energy reserves cannot sufficiently meet the Nation's needs. Foreign sources have been easily obtained and relatively inexpensive in the past, but are becoming prohibitively costly and less available. To assure a continuing adequate supply of mineral and energy resources, it is necessary to continually locate new resources.

Location and development of mineral/energy reserves is expensive. In the search for energy and mineral resources, individuals and/or corporations rely on an understanding of mineral/energy resource formation processes, and upon what geologic conditions tend to localize them in one place and not in another. In this way, possible mineral and energy resources can be efficiently delineated and financial risk can be minimized.

A. Types of Mineral Deposits in Western Montana: The geology and structure of Western Montana are favorable to varied types of economic mineralization. Types of mineralization occurring in the Planning Area are described below:

1. Injection veins and contact zones are associated with intrusive rocks. Conditions especially favorable to mineralization are associated with faulting and shearing in and near intrusives.

2. Pegmatite (a type of coarse-grained intrusive rock) is found within and near some larger bodies of intrusive rock. Pegmatites often contain economic and subeconomic concentrations of minerals. Conditions especially favorable to mineralization are associated with faulting and shearing in and near intrusives.

3. Porphyry-type deposits are large, low-grade disseminated deposits within or adjacent to intrusives.

4. Segregation-type deposits are associated with sills.

5. Coeur d'Alene-type vein deposits are associated with shearing and faulting, generally within harder Belt Supergroup quartzites.

6. Some vein-type deposits are associated with dikes and sills. Conditions especially favorable to this type of mineralization are associated with faulting and shearing in or near dikes and sills.

7. Placer deposits are formed by glacial and alluvial processes.

8. Stratabound deposits are large, low-grade disseminated deposits within metasedimentary rocks. Different factors influence whether (and the degree to which) minerals are localized within a given stratigraphic horizon. Not enough is presently known about these factors to completely understand the localization of stratabound deposits.

B. Mineral and Energy-Related Activities in Western Montana: Since man has inhabited Western Montana, there has always been some mining activity in the Area. Activities have primarily been by individuals when metals prices were much lower and mining technology much less advanced than today. Now, with higher metals prices and advanced technology, Western Montana has become an exploration target area for large companies seeking mineral resources and, to some extent, energy resources. Figure 8 shows mineral potential in Western Montana.

Activity related to discovery, development, and production of locatable minerals in the Planning Area has been significant. Table 38 provides information about this activity; locations of the 10 operations described in the table are shown in figure 8. Currently producing operations include:

1. W. R. Grace and Company's open pit Vermiculite Mountain mine and mill northeast of Libby (T. 31 N., R. 30 W.). This operation employs 300 persons and has a mill capacity of 8,000 tons of vermiculite ore per day.

2. U.S. Antimony's Babbit underground mine and mill at Prospect Creek (T. 21 N., R. 31 W.). It employs 30 persons and has a mill capacity of 300 tons of antimony ore per day.

3. The underground Black Pine mine at Philipsburg (T. 8 N., R. 14 W.). It employs 27 persons and is producing gold and silver veins.

Recently, the most intense development activity has been related to stratabound copper-silver deposits that are expected to be developed on a large-scale basis. The Mt. Vernon or Spar Lake deposit (discovered by Bear Creek Mining Co. in 1963) is currently the most significant stratabound copper and silver deposit in Western Montana. The American Smelting and Refining Company (ASARCO) is preparing to mine the deposit (the Troy Project) under an agreement with Bear Creek Mining Co. Extensive exploratory drilling has been completed and some adits have been driven into the ore body to confirm drilling results.

LOCATABLE & LEASEABLE MINERAL & ENERGY RELATED ACTIVITY

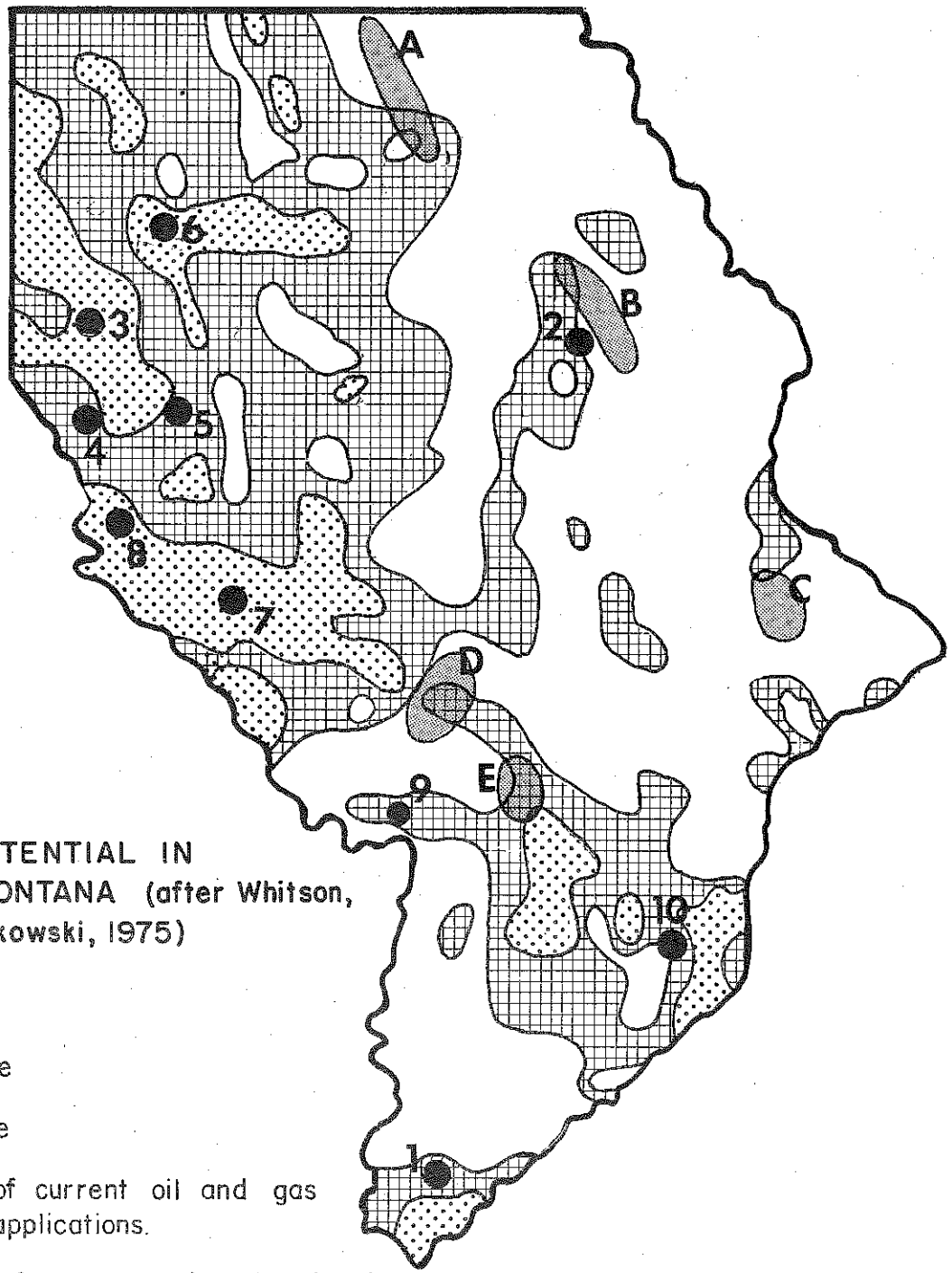


Figure 2

MINERAL POTENTIAL IN WESTERN MONTANA (after Whitson, 1975 and Satkowski, 1975)

- Proven
- Probable
- Possible
- A — E Areas of current oil and gas lease applications.
- 1 — 10 Areas of current mineral related activity.

Table 38

CURRENT MINERAL-RELATED ACTIVITY IN THE [illegible]ERN MONTANA PLANNING AREA 1/

Forest	Project, Mine Name	Company	Location 2/	Mineral Commodities and Types of Activity 3/
Bitterroot		Superior Mining Co.	(1) Overwich-Drop Creek Area; T. 15, R. 20 W.	Cu, Mo (porphyry) Exploration drilling
Flathead	Corkscrew-Babtiste Area	Three groups of individuals	(2) East side Hungry Horse Reservoir. T 27 N , R 16 W	Cu (stratabound?) Exploration and analysis
Kootenai	Troy Project	ASARCO	(3) Ross Mt Spar Lake; T. 28 N., R. 34 W.	Cu Ag (stratabound); under development
Kootenai	(Satellite properties) Rock Creek Vermillion River Sex Peak	ASARCO	(4) Rock Cr. - (Cabinets); (5) Vermillion R. & Sex Peak - (Miners Cr)	Cu (stratabound) Assessment work
Kootenai	Vermiculite Mt.	W. R. Grace	(6) Rainy Cr., NE of Libby; T. 31 N., R. 30 W.	Vermiculite (disseminated); increasing production
Lolo	Monarch	June Alexander	(7) NW of St. Regis	Barite (veins); shipping to Missoula
Lolo	Babbitt & Mowich Mines	U. S. Antimony	(8) Prospect Cr.; T. 21 N., R. 30 W.	Sb (veins); production
Lolo	Ward Mine	Ward Development Co.	(9) East Fork Lolo Cr., Dick Cr.; T 11 N., R 22 W.	Pb Zn Ag Cu (veinlets disseminated) constructing mill and developing
Deerlodge	Black Pine Mine		(10) Philipsburg; T 8 N., R. 14 W	Au (veins) producing

1/ Source: USDA Forest Service, Missoula, Montana.
2/ Numbers 1-10 refer to locations shown on the accompanying map.
3/ Ag-silver; Cu-Copper; Mo-Molybdenum; Pb-Lead; Sb-Antimony; Zn-Zinc.

According to ASARCO, the deposit is a zoned, stratabound ore-body containing economic concentrations of disseminated copper sulfides and silver. ASARCO estimates the mineable ore reserve to be approximately 50,000,000 tons. The average grade of the ore is estimated to be 0.74 percent copper and 1.5 oz. silver per ton.

ASARCO plans the development and construction of a copper-silver mine and mill complex. The mining method will be underground room and pillar with access via adits. Ore minerals will be concentrated through flotation processes. The project is expected to continue for approximately 16 years. At present, the development and construction phase of the project, expected to last about 3 years, has not yet been implemented.

The Ward Lode of the Ward Developing Co., which is being actively developed, is located on the East Fork of Lolo Creek (T. 11 N., R. 22 W.). Construction of a 150-ton per day mill is planned for this operation; the mill would use flotation processes to concentrate lead, zinc, silver, and copper ore from the open pit mine.

Individuals' mining activities within Western Montana are also significant. Individuals are typically searching for or working small veins within a relatively limited area. Although the mining activity of each individual is generally relatively small, these activities collectively are significant.

Placer mining activity throughout the area has increased dramatically in recent years with the increase in gold prices. Renewed interest has especially been shown in the gold placers of the Ninemile and Superior areas near Missoula.

Other leaseable nonenergy materials, such as sand, gravel riprap, borrow, and some building stone, are readily available. Extraction of these materials from National Forest land for use other than by the Forest is not substantial at present. Some locatable, uncommon-variety building stone is located within the Prichard Formation (in the vicinity of T. 18 N., R. 26 W.). Recently, there has been increased interest in mining the deposit.

The potential for activities related to the development of energy materials in Western Montana is not well known at present. The only known potentially exploitable occurrences of coal in the Planning Area are low-grade lignites found in carbonaceous Tertiary sediments in the Flathead region. These have not yet been economically worked, but it is possible that they might be used to generate electricity locally in the future.

The Area's oil and gas potential is speculative at present. Table 39 provides information about proposed oil and gas exploration and development activities in the Area; the eight locations described in the table are shown in figure 8. Oil and gas lease applications for exploration in the

Table 39

PROPOSED OIL AND GAS EXPLORATION AND DEVELOPMENT
IN THE WESTERN MONTANA PLANNING AREA 1/

Forest	Location of Proposed Lease Area 2/	Acres	Company(s) Involved
Flathead	(A) North Fork Flathead River (B) South Fork Flathead River	236,000	Various
Lolo	(C) Scapegoat Mt., Flint Pk., Evans Pk.; T. 18 N., R. 10 W.	12,727	Hunt
Lolo	(C) Tobacco Valley; T. 18 N., R. 9 W.; 18 N., R. 10 W.	7,665	Kerr
Lolo	(C) Olson Pk.; T. 17 N., R. 9 W.	6,131	Maxine Amick
Lolo	(D) T. 13 N., R. 20 W.	156.1	
Lolo	(D) T. 14 N., R. 20 W.; T. 15 N., R. 20 W.	1,357	Nyvatex Oil Corp.
Lolo	(E) T. 11 N., R. 19 W.	1,560	Nyvatex Oil Corp.

1/ Source: USDA Forest Service, Missoula, Montana; represents areas known by the Forest Service--not a complete listing for the area.

2/ Letters A-E refer to locations shown on the accompanying map.

X

Flathead region west of the Lewis and Clark overthrust have increased dramatically within the last several years; to date, however, there has been no drilling. Limited exploratory drilling for oil and gas has been completed in the Drummond area east of Missoula and more drilling is contemplated in that area.

Exploration for radioactive minerals in Western Montana has centered around the granitic Idaho batholith in southwestern Montana. Uranium oxides and other radioactive minerals are known to occur in economic quantities in and near granitic intrusive rocks. No economic deposits of radioactive minerals have yet been identified in the Planning Area.

Numerous hot springs are located throughout Western Montana. Water temperature in these systems is not extremely high, and most of these systems are not believed to be very large. At present, the potential for development of these hot spring systems as geothermal energy sources is not known. However, in the future, they are likely to be potential exploration targets. 1/

C. Surface Impacts which Result from Mineral- and Energy-Related Activities: The general extent of surface impacts from mineral- and energy-related activities has been defined in terms of four mining activities: prospecting, exploration, development, and production.

1. Prospecting involves the search for outcrops or surface exposures of mineral deposits. It also involves the preliminary exploration to test values of lodes or placers already known to exist and to determine the approximate extent of the payable ground. 2/ The intent of prospecting is to find a target area suitable for future exploration.

Impacts to the ground from prospecting would be extremely light or nonexistent, as the methods are surficial in nature. Specific activities might include: surficial examination of accessible rock outcrops or talus slopes for evidences of minerals, large-scale reconnaissance geologic mapping, collection and analysis of hand specimens, reconnaissance stream sediment sampling at the mouths of major streams, collection of geophysical data over large areas (aeromagnetic or gravity surveys), and collection of data utilizing the newer remote sensing techniques (multispectural scanners or side-looking radar).

2. Exploration is the search for ore by 1) geological surveys; 2) geophysical surveys; 3) bore holes and trial pits; or 4) surface or underground headings, drifts, or tunnels. It aims at locating economic deposits and establishing their nature, shape, and grade. Investigation can involve either the preliminary or final work needed to determine the size, shape, position, and value of an ore body. 3/

1/ White, D. H., and D. L. Williams, eds., 1975, Assessment of Geothermal Resources of the United States - 1975: U.S. Geol. Survey Circ. 726.
2/ Thrush, P. W., ed., 1968, A Dictionary of Mining, Mineral, and Related Terms: U.S. Dept. of the Interior, Bureau of Mines.
3/ Ibid.

Surface impacts caused by exploration vary, depending on the method used to explore, the size of the target area, and funds available for the project. Exploration is a continuation of some prospecting activities, but the area of interest is usually smaller. Generally, scattered, minor surface impacts may occur during initial exploration activities because the target area is not yet clearly defined. Activities may include an exploratory drilling program necessitating access roads, drill sites, and open cutting or trenching to expose bedrock. Detailed geologic mapping, soil sampling on a closely spaced (50 to 100 feet) grid pattern for geochemical analysis, and seismic, resistivity, or induced polarization surveys may also be used; surface impacts using these methods would be almost negligible.

3. Development involves opening up an ore body by sinking shafts, driving drifts, and installing requisite equipment. It prepares a proven ore body for mining and transporting ore. 4/

Development follows exploration work and causes the greatest intensity of surface disturbance of all mineral- and energy-related activities; however, the working area is fairly well defined and generally limited to the area of future operations. Drilling begun during exploration may continue, but the holes will be more closely spaced and most drilling can be done from existing roads. Other activities would include preparation and development of the actual operation site; construction of ore bins, stockpile areas, and dump space for mine waste; improvement of the road system to and within the operating area; and, possibly, preparatory work for mill construction. In most cases, this work may be done from existing roads.

4. Production involves mining and transporting ore from a mine to the mill or market. The yield or output of a mine is also referred to as its production. 5/

In this phase of the operation, facilities used are primarily those constructed during development. Little additional surface disturbance will result except within the mining operation area or, in the case of onsite concentration, from disposal of mill tailings. To maintain ore reserves, limited surface drilling may be continued to find new extensions of the ore body. Minor adjustment of the road systems or movement of facilities may be necessary to fit changing needs or conditions of the operation.

At times the intensity of all mining activities may be related to the amount of financial risk involved, national and international politics, changing technology, and other factors.

Any mining activity on unpatented National Forest land is only a temporary use of the land, and restoration is possible after mining activities cease.

4/ Ibid.
5/ Ibid.

Reclamation activities are carefully supervised and controlled to minimize permanent surface impacts.

D. Electrical Transmission Lines and Oil and Gas Pipelines: Energy resources cannot be adequately discussed without also discussing energy transportation. All the hydroelectric generating plants in Western Montana are tied to the interstate Northwest Power Pool. Thus, the Planning Area, particularly the northern portion, contains a network of high-voltage electrical transmission lines. All major lines are tied to the BPA Hot Springs substation, which is the main distribution center for Western Montana. Table 40 shows termini, capacity, years in service, and utility (ownership) of these major lines. In addition, hundreds of miles of low-voltage distribution lines serve communities and rural areas. Many of these lines cross National Forest land. An oil pipeline between Billings and Spokane also crosses the Area. 6/

As demands for energy continue to grow, there will also be demands to enlarge existing energy transportation routes and to establish new routes. Northern Tier Pipeline has proposed a 40-inch diameter pipeline to carry Alaskan crude oil between the West Coast and refineries in the Midwest. This line would cross Western Montana. Two 500 kV ac double circuit transmission lines are proposed from Colstrip to Hot Springs, Montana, and a 230 kV line is proposed between Anaconda and Hamilton.

In 1977, the Forest Service and the Bonneville Power Administration jointly studied long term energy needs of the Pacific Northwest. Working papers were compiled into a draft report 7/ which examined:

1. The magnitude of long-range energy requirements.

2. The magnitude of future energy transportation needs.

Of all electric energy used in the Pacific Northwest, approximately 84 percent is used west of the Cascade Mountains, 9 percent between the Cascades and the intermountain ranges (mountains between the Rockies and Cascades), and the remaining 7 percent between the intermountain ranges and the Rocky Mountains. For the purpose of the FS/BPA study, it was assumed that in the future, most electrical generation will be derived from nuclear or coal fuel.

Based on these projections, additional generating capacity over the period 1985 to 2020 should fall within the range of 60,000 megawatts to 420,000 megawatts, depending upon the annual rate of load growth. According to the study, with an annual growth rate of 4.9 percent, the most likely increase is about 160,000 megawatts (See Figure 9).

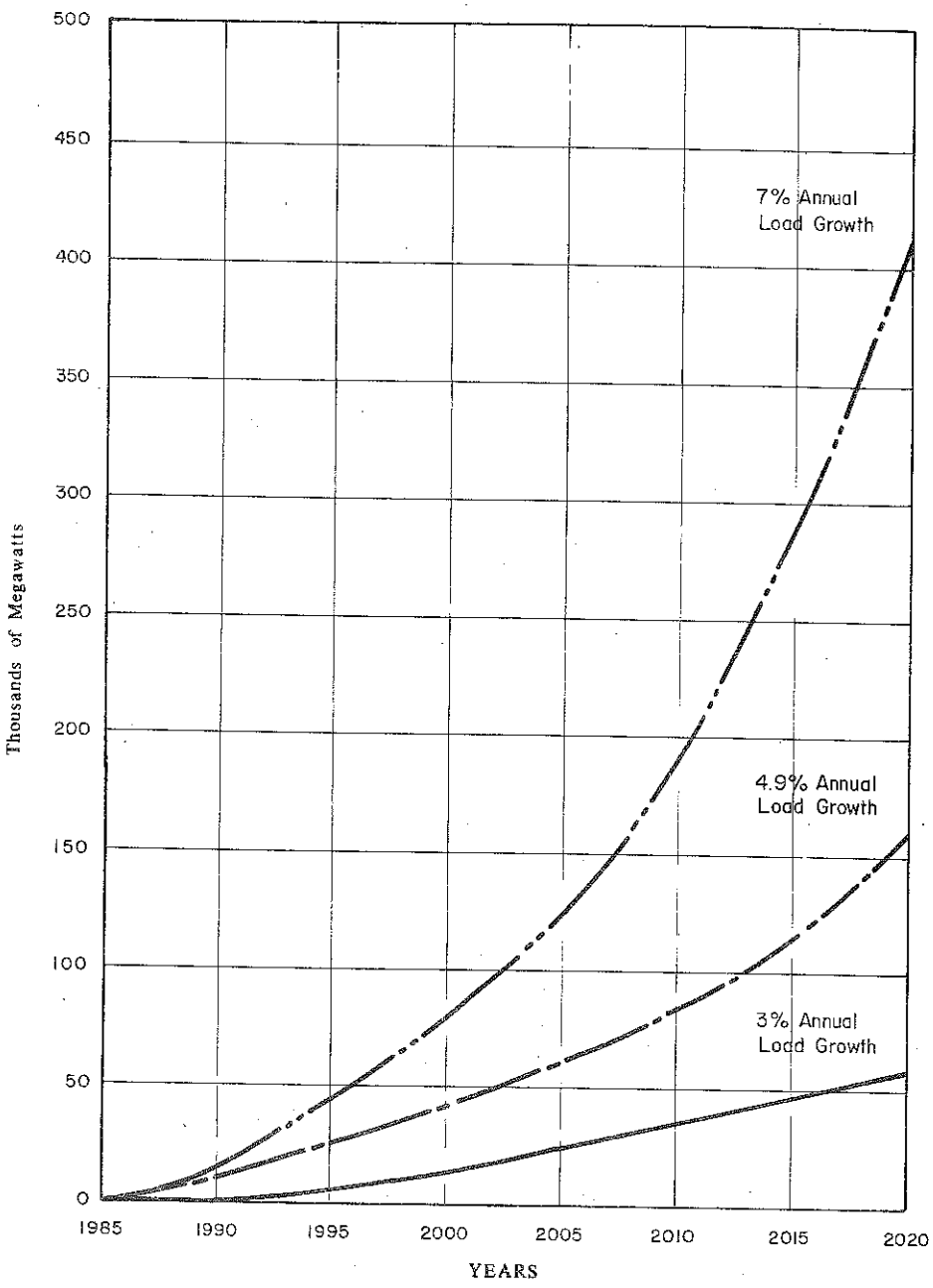
6/ A 10-inch diameter pipe carrying petroleum products. Owned by Yellowstone Pipeline Co.

7/ Potential Energy Corridor Requirements for the Pacific Northwest; Long Range (1985-2020), Report to the Joint Bonneville Power Administration - Forest Service, 1977 Meeting, Working Papers by Joint BPA/FS Work Group No. 1, April 1977.

Figure 9

PACIFIC NORTHWEST LOAD GROWTH*

1985 – 2020



1. 7% Annual Load Growth assumes that end use energy would be converted from conventional oil and gas comsumption to electric energy consumption.

2. 4.9% Annual Load Growth represents the expected future loads in the Pacific Northwest.

3. 3% Annual Load Growth assumes extensive energy conservation.

*BPA Extrapolation of forecasts prepared by the Pacific Northwest Utilities Conference Committee for the West Group and projected loads in Idaho and western Montana.

The above estimates do not include the effect of plant maintenance, forced outages, retirement of existing projects, etc. Reserve capacity requirements would increase the necessary generating capacity by about 15 percent. Also, energy transportation (transmission losses, coal slurry pipeline pumping, etc.) will require approximately 5 to 10 percent additional energy.

Table 40

TERMINAL CAPACITY AND OWNERSHIP OF EXISTING AND PROPOSED
100 KV OR LARGER TRANSMISSION LINES IN WESTERN MONTANA

Termini	Rated Capacity-kv.	Yr. in Service	Utility
Noxon Rapids-Conkelly-Hungry Horse	230	Existing	BPA
Hot Springs-Conkelly	230	Existing	BPA
Kerr Dam-Hungry Horse	115	Existing	BPA
Cabinet Gorge-Noxon-Hot Springs	230	Existing	WWP
Pine Creek-Noxon Rapids	230	Existing	WWP
Spokane-Noxon Rapids	230	Existing	BPA
Noxon Rapids-Hot Springs	230	Existing	BPA
Dworshak-Hot Springs	500	Existing	BPA
Hot Springs-Ovando-Anaconda	230	Existing	M.P. Co.
Hot Springs-Anaconda	230	Existing	BPA
Burke-Thompson	2(100)	Existing	M.P. Co.
Avery-East Portal-Missoula	100	Existing	B.N.R.R.
Kerr Dam-Rattlesnake-Missoula	2(161)	Existing	M.P. Co.
Ovando-Great Falls	230	Existing	M.P. Co.
Rattlesnake-Anaconda	2(161)	Existing	M.P. Co.
Missoula-Gold Creek	100	Existing	B.N.R.R.
Missoula-Hamilton	161	Existing	M.P. Co.
Conkelly-Trego	115	Existing	BPA
Anaconda-Hamilton	161	1978	M.P. Co.
Libby Intertie (Noxon Rapids-Libby Dam)	230	1982	BPA
Colstrip-Hot Springs	2(500)	1979	M.P. Co.
Hot Springs-Spokane	500	1979	BPA

Five technologies capable of transporting the equivalent of 10,000 megawatts of electric energy were identified in the study: (1) overhead electric transmission; (2) coal-slurry pipelines; (3) railroads; (4) water transportation (coal barging); and (5) other new technologies (such as super-cooled transmission cables). Using dc transmission lines and coal-slurry pipelines, it was estimated that by the year 2020, up to seven energy transmission corridors would probably be needed between the coal fields of eastern Montana, Wyoming, Utah, and Colorado, and load centers near the West Coast. Each corridor may contain up to three transmission lines. No corridor routes were identified.

When transmission lines are proposed across National Forest land, the Forest Service must become involved in corridor location. Using information obtained through the land systems inventory (described in sec. 7.11), the Northern Region of the Forest Service has made "suitability interpretations" for overhead transmission lines in Western Montana. 8/ Suitability for road construction, staging areas, and structure siting were used to determine the overall suitability of each mapping unit on the Western Montana subsection map (see appendix). Table 41 shows these suitability ratings. Table 42 describes the suitability classes and factors limiting suitability. It is emphasized that these ratings are broad interpretations of land suitability, based on standard construction practices for high-voltage transmission lines. They cannot be used to identify corridors; a great deal more must be known about probable impacts associated with a specific project before overall suitability for transmission line construction can be determined.

8/ Land Suitability Pattern for Electrical Transmission Lines, USDA Forest Service, Northern Region, December 1976.

TABLE 41

OVERHEAD ELECTRICAL TRANSMISSION LINE
SUITABILITY INTERPRETATIONS

Mapping Unit	Road Construction	Staging Areas	Structure Siting	Overall Suitability
A_2	Fair 1, 2	Good	Fair 1, 2	Fair
B_1	Good	Good	Good	Good
B_2	Good	Good	Good	Good
B_3	Good	Good	Good	Good
B_4	Good	Good	Good	Good
B_5	Good	Good	Good	Good
B_6	Good	Good	Good	Good
F_1	Fair 2, 7	Fair 2	Good	Fair
F_2	Fair 7	Good	Fair 8	Fair
F_3	Good	Good	Good	Good
F_4	Good	Good	Good	Good
F_5	Fair 5, 6, 7	Fair 5	Fair 8	Fair
F_6	Good	Good	Fair 8	Good
F_7	Fair 7	Good	Good	Fair
M_1	Fair 5, 7	Fair 5	Good	Fair
M_2	Fair 5, 6	Fair 5	Fair 8	Fair
M_3	Fair 5	Fair 5	Good	Fair
M_4	Fair 5	Fair 5	Good	Fair
M_5	Poor 5, 6	Good	Good	Poor
M_6	Fair 2, 4	Fair 2	Fair 4	Fair
M_7	Fair 5	Fair 5	Good	Fair
M_8	Poor 5, 7	Fair 5	Good	Poor
M_9	Fair 5	Fair 5	Good	Fair
M_{10}	Poor 6, 8	Poor 6, 8	Fair 8	Poor
M_{12}	Poor 6, 8	Poor 6, 8	Fair 8	Poor
M_{13}	Fair 5	Fair 5	Good	Fair
M_{14}	Fair	Fair 5	Good	Fair
M_{15}	Fair	Fair 5	Good	Fair
M_{16}	Fair 5	Fair 5	Good	Fair
M_{17}	Fair 4	Good	Good	Fair
M_{18}	Poor 4, 5, 7	Fair 5	Good	Poor
M_{19}	Fair 4, 5	Fair	Good	Fair
M_{20}	Fair 4, 5, 6	Fair 5, 6	Good	Fair
M_{21}	Good	Good	Good	Good
M_{22}	Poor 4, 5, 7	Fair 5, 7	Good	Poor
M_{23}	Fair 7	Good	Good	Fair
M_{24}	Poor 6, 7	Poor 5, 6, 8	Good	Poor
M_{25}	Fair 5	Fair 5	Good	Fair
P_1	Good	Good	Good	Good
P_2	Fair 3, 7	Good	Good	Fair
P_3	Poor 3, 6, 7	Fair 5	Fair 3	Poor
P_4	Good	Good	Fair 3	Good
P_5	Good	Good	Good	Good
P_6	Fair 3, 7	Good	Good	Fair
P_7	Fair 5	Good	Good	Fair
P_8	Fair 5	Good	Good	Fair
P_9	Fair 7	Good	Good	Fair
P_{10}	Good	Good	Good	Good
P_{11}	Fair 5, 7	Good	Good	Fair
P_{12}	Fair 5, 7	Good	Good	Fair
P_{13}	Good	Good	Good	Good

Table 42

SUITABILITY CLASSES AND FACTORS LIMITING SUITABILITY

SUITABILITY CLASSES

Good: Limitations can be overcome by normally applied practices. No special treatment required.

Fair: Limitations can be overcome by special design, location, or practices which are available, but not normally used. Suitable for the use, but at additional cost.

Poor: Limitations are difficult and/or costly to overcome. Either technology is not available, or it is extremely costly to apply. The land may be allocated to the use, but an environmental cost is unavoidable.

The following limitations or combinations of limitations were given a poor rating.

Construction

a. A severe road cutbank slump hazard: because of the lack of a dependable, economically practical method of stabilizing unstable cutbanks.

b. Steep slopes and shallow hard rock: because of the cost of heavy cut-fill construction through hard rock.

c. Steep slopes and a severe sediment pollution hazard: because there is no effective means for controlling sediment from heavy cut and fill construction in highly erosive soils during the construction period.

EXPLANATION OF THE LIMITATIONS RELATING TO "FAIR" & "POOR" RATINGS IN THE SUITABILITY TABLE

1 FLOODING HAZARD & HIGH WATER TABLE--Includes law areas frequently flooded and recent alluvial areas with low bearing strength for vehicular travel and structure foundations due to high water table.

2 POOR TRAFFICABILITY--Material high in silt and clay--frost heaving and dust.

3 SHRINK SWELL CLAYS--Moderate bearing capacity when wet.

4 MASS FAILURE--Much of the area has a severe slump hazard and it would be very difficult to locate access roads and, to some degree, structure foundations.

5 STEEP SLOPES--The necessity of heavy cut and fill in areas of high relief would be a limitation to road building.

6 ROCK OUTCROP--Rough broken rockland, steep slopes make crossing difficult. Areas of high relief, broken terrain through which it would be costly to attempt cut and fill road construction.

7 SEDIMENT RISK--Limits the suitability of a unit by increasing the difficulty of controlling sediment pollution of surface waters during construction of access roads and staging areas; limitations after construction has been completed will be determined by traffic intensities, season of use and success of vegetation reseeding program

8 HARD MASSIVE ROCK--Areas of shallow soils underlain by hard, massive rock, difficult, and costly for structure foundation construction.

7.72 ASSUMPTIONS FOR TOMORROW

1. Demands to develop domestic mineral deposits and energy sources (Project Independence) will increase.

2. Mineral exploration and the number of active mining claims is expected to increase. The number of mining claim exams, contest actions, operating plan reviews, patent applications, etc., is expected to increase accordingly.

3. Increased demands for minerals will lead to development of lower-grade ore bodies.

4. If passed, two bills that have been introduced in Congress (H.R. 5806 and S. 1248) would supersede the present location and patent system by establishing a mineral leasing system. A leasing system would result in some short-term impacts to National Forest administration. For example, the number of patent applications would greatly increase for a period of time.

5. As mining activity increases, continued revision of minerals multiple use planning data is anticipated. More detailed minerals inventories will be needed for District use in timber sales for preparation and other uses.

↑ Ranger

6. More public contact and education regarding mining-related topics will be required.

7. Through the organization of local chapters representing mining interests, there will be opportunities for the Forest Service to work cooperatively with miners.

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HUMAN AND COMMUNITY DEVELOPMENT ELEMENT

7.8 HUMAN AND COMMUNITY DEVELOPMENT ELEMENT

The Human and Community Development Element has the following objectives: (1) generate forestry opportunities to accelerate rural community growth; (2) encourage growth and development of forestry-based enterprises that readily respond to consumers' changing needs; (3) improve the welfare of underprivileged members of society; and, (4) expand public understanding or environmental conservation.

7.81 THE AREA TODAY

A. Human Resource Programs: Goals for this element are pursued through human resource programs, such as Job Corps, Young Adults Conservation Corps, Youth Conservation Corps, the Senior Community Service Employment Program, and "hosted" programs carried out in cooperation with other agencies. Participation in these programs in Western Montana is shown in table 43.

1. Job Corps: Job Corps is a vocational training program for economically disadvantaged youth from 16 through 22 years old. The program provides needed basic education and on-the-job vocational training. The Forest Service enters into contracts with trade unions to provide such training, along with job placement. The Bitterroot National Forest has the only Job Corps program in the Western Montana Planning Area.

2. Hosted Programs: These are programs in which people are employed by the Forest Service (with the Forest Service acting in a supervisory role), but paid by another agency. The Comprehensive Education Training Act (CETA) authorized several programs (titles) which are hosted by the Forest Service--Title I; Adult Work Experience; Titles II and VI: Public Service Employment; and Title VIa: Public Service Projects. There are currently 257 participants in these three CETA programs working in Western Montana National Forests.

3. Youth Conservation Corps (YCC): YCC is an 8-week summer employment program for youths aged 15 through 18. The program has three objectives: (1) to provide summer employment for youths; (2) to complete needed conservation work; and (3) to develop in the enrollee an awareness and an appreciation of the environment. Nationally, the Forest Service and the Department of the Interior each administer 35 percent of this program, and the remaining 30 percent is administered through a State grant program. In the Forest Service Northern Region, participation in the YCC program has grown from 78 persons in 1972 to an estimated 712 persons in 1978. The firm estimate for participation in the YCC programs in Western Montana in 1978 is 170 and an additional 144 positions may be made available.

Table 43

PARTICIPATION IN HUMAN RESOURCE PROGRAMS;
WESTERN MONTANA NATIONAL FORESTS 1/

(1978)

Program	Number of Participants by Forest				
	Flathead	Kootenai	Lolo	Bitterroot	Total
Job Corps				224	224
Hosted Programs (CETA)	86	96	25	50	257
YCC (1978 firm estimate)	48	16	50	56	170
(tentative additional)	24	52	42	26	144
YACC (nonresident)	10	20	20	20	70
(resident)				50	50
SCSEP	1	1	5	2	9
Green Thumb		2		3	5
Vocational Rehabilitation 2/		2			2

1/ Participation in programs in the Philipsburg Ranger District, Deerlodge National Forest, and the Lincoln Ranger District, Helena National Forest is not included in figures for the Western Montana Planning Area.

2/ Total participation throughout the Area's National Forests is not known.

4. Young Adult Conservation Corps (YACC): This is an emergency employment program (Title VIII of CETA) implemented in October 1977 to provide employment for unemployed individuals from 16 through 23 years old. As with the YCC program, the Forest Service administers 35 percent of the National YACC program. Participants employed by the Forest Service perform labor-intensive conservation work in National Forests.

There are two types of YACC employees--"resident" empoyees, who live in facilities owned or contracted for by the Forest Service, and "nonresident" employees, who live at home. Approximately 50 such "resident" employees will work on the Lolo National Forest in 1978 and an additional 70 "nonresident" employees will work in Forests throughout the Planning Area.

5. Senior Community Service Program (SCSEP): SCSEP provides part-time employment opportunities for persons 55 years of age or older who meet the criteria for poverty level income. Individuals are employed in positions where their skills can be used. Nine persons are currently employed by Western Montana Forests through this program.

6. Green Thumb: Green Thumb is another program for older Americans. The Forest Service "hosts," or supervises, employees sponsored by another agency--in this case, the Farmers Union. There are five Green Thumb employees in Western Montana.

7. Other Human, Resource and Community Development Programs: The Forest Service provides or participates in many other programs which help meet goals for human and community development. At the time this document was prepared, the amount of participation in the following programs in Western Montana was unknown.

a. College and Vocational Work Study: This is another hosted program, which is implemented primarily at the Forest level.

b. Work Incentive (WIN): Through this hosted program, the Forest Service provides work experience for members of families receiving Federal Aid for Dependent Children. Participation in this program can last up to 13 weeks.

c. Volunteers to the National Forests: In FY 1977, 360 volunteer workers in the Forest Service Northern Region completed work appraised at over $210,000. There are legal limits to the amount of work an individual can contribute.

d. Emergency Unemployment Program: An emergency employment program is initiated when there are three consecutive months in which unemployment exceeds 7 percent. While there is currently no such program, the Forest Service Northern Region has received $2.5 million for emergency unemployment in the past. Funding is from the Department of Commerce.

e. Vocational Rehabilitation: Handicapped persons are employed by the Forest Service under this program.

B. State and Private Forestry Cooperative Programs

The State and Private Forestry arm of the Forest Service is involved in the Cooperative Forest Management Program (CFM), which benefits communities and rural areas. In one aspect of the program, the Forest Service cooperates with the Montana Department of Natural Resources and Conservation and other agencies to provide technical assistance, training, and funding for urban forestry.

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7. ASSUMPTIONS

1. Significant expansion of the Northern Region's YACC program is anticipated until the program creates a significant effect on the current National unemployment situation.

2. Growth of the YCC program will be limited to readjustments of funding among Forest Service Regions. This $6 million National program currently is at its maximum legal size.

3. The Job Corps program is expected to expand on a National scale, but no further growth is anticipated in the Forest Service Northern Region.

4. Continued growth in the SCSEP program is anticipated.

5. Forests will become more involved in Adult Work Experience, Public Service Employment, and Public Service Programs (Titles I, II, and VIa of CETA) as their knowledge of the programs grow. However, because there are more requests for this program each year, there may be a need for program decreases in the future.

PROTECTION ELEMENT

7.9 PROTECTION ELEMENT

The mission of the Protection Element is to provide for those activities which protect and maintain basic values and prevent and reduce damages and losses to National Forest and Rangeland resources. Activities include insect and disease control, fire protection, law enforcement, the development of new knowledge, and the technical assistance needed for both National Forest and private forest and rangeland management.

7.91 The Area Today

A. Fire Management: The objective of fire management is to provide the fire protection and use programs which are needed to help meet National Forest land management objectives. Fire management activities include fire prevention, detection, presuppression, suppression, fuel and smoke management, and prescribed burning.

The Forest Service provides fire protection for about 9.9 million acres of land in Western Montana; 8.9 million of these acres are in National Forests. About 585 fires occur each year on this 9.9 million acres, burning about 6,500 acres. Sixty-five percent of the fires are lightning-caused and 35 percent man-caused. Increasing fuel accumulation resulting from land management activities and past fire suppression and prevention has greatly increased the potential for major fires and complicated the job of fire management.

B. Air Quality: Air quality in Western Montana is influenced by a variety of natural and manmade forces. Wildfire, windstorms, and controlled slash burning contribute large quantities of suspended particulates to the air. Industries such as pulp mills, saw mills and plywood, particle board, and aluminum plants also inject significant amounts of particulates into the atmosphere. Biologically-toxic gases are emitted by several industries in the Area, including an aluminum plant and a pulp mill.

Standards for clean air are established primarily to protect human health and secondarily to protect human welfare. All standards allow for some degredation of air in order that industries can operate. While allowing employment of people and use of various resources, increased emissions may damage human health and welfare in ways that we are unaware of today.

The Montana Department of Health and Environmental Sciences' Air Quality Bureau routinely measures air quality throughout Montana and comparies it with Federal and State ambient air quality standards (see tables 44 and 45). The boundaries of the State's Missoula Air Quality Control Region correspond very closely with the Western Montana Planning Area and air quality data collected by the State is directly applicable to the Planning Area.

Table 44

FEDERAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Primary[1] (ug/m^3)[3]	Primary[1] (ppm)[4]	Secondary[2] (ug/m^3)[3]	Secondary[2] (ppm)[4]	Averaging Time
Particulates	75	---	60	---	Annual
	260*	---	150	---	24-Hour
Sulfur Dioxide	80	0.03	---	---	Annual
	365	0.14	---	---	24-Hour
	---	---	1,300*	0.5	3-Hour
Carbon Monoxide	10,000	9.0	---	---	8-Hour
	40,000*	35.0	---	---	1-Hour
Photochemical Oxidants	160*	0.8	---	---	1-Hour
Hydrocarbons	160*	0.24	---	---	3-Hour (6-9 a.m.)
Nitrogen Oxides	100	0.05	---	---	Annual

1/ Primary standards are to protect human health.
2/ Secondary standards are to protect human welfare.
3/ ug/m^3 = micrograms/cubic meter.
4/ ppm = parts per million.

*Not to be exceeded more than once/year.

Source: Annual Air Quality Data Summary for Montana, Montana Department of Health and Environmental Sciences, Environmental Sciences Division, Air Quality Bureau, Helena, Montana, April 1976.

Table 45

MONTANA AMBIENT AIR QUALITY STANDARDS

Pollutant	Standard	Averaging Time
Suspended Particulates	75 ug/m^3 a/	Annual
	200 b/ ug/m^3	24-Hour
Sulfur Dioxide	0.03 ppm c/	Annual
	0.10 d/ ppm	24-Hour
	0.25 e/ ppm	1-Hour
Settled Particulates	15 T/mi^2 (residential area)	3-Month
	30 T/mi^2 (industrial area)	3-Month
Suspended Sulfates	4 ug/m^3	Annual
	12 f/ ug/m^3	--
Reactive Sulfur	0.25 mg SO / 100 cm^2/day	Annual
	0.50 mg SO / 100 cm^2/day	1-Month
Fluorides, Total in air (as HG)	1 ppb	24-Hour
Fluorides (Gaseous)	0.3 ug/cm^2/28 days	28-days

a/ug/m^3 = micrograms/cubic meter.
b/ Not to be exceeded more than 1 percent of the days in a year.
c/ ppm = parts per million.
d/ Not to be exceeded more than 1 percent of the days in a 3-month period.
e/ Not to be exceeded for more than 1 hour in any 4 consecutive days.
f/ Not to be exceeded more than 1 percent of the time.

SOURCE: Annual Air Quality Data Summary for Montana, Montana Department of Health and Environmental Sciences Division, Air Quality Bureau, Helena, Montana, April 1976.

Total suspended particulate for five locations in the Planning Area are shown in table 46. In Columbia Falls, Kalispell, and Missoula, the Montana particulate standards were violated in 1975 and 1976; in Phillipsburg and Libby particulates were very high, but still below the standards. The specific sources and composition of particulates in these locations are not known. Particulates can be composed of a variety of chemical compounds and there are many different sources--dust, ashes, soot, sulfates, to name a few. Particulates less than 1 micron in diameter can cause respiratory problems in animals and can be toxic to plants. Data indicate that air quality in portions of the Planning Area is poor, in terms of total suspended particulates.

Controlled burning of logging residues contributes substantially to total suspended particulate during burning periods, but quantitative estimates for the Planning Area are not available. However, it is know that most particles released during wood burning are between .5 to .8 microns, well within the range that may cause respiratory system damage. An intensive smoke management program by the State and the Forest Service has substantially reduced the problem of fire-generated particulates.

A combination of chemicals containing sulfur (such as sulfur dioxide, hydrogen sulfide, and mercaptans) emitted by the Hoerner Waldorf pulp and paper mill in Missoula are causing continuous injury to conifers in the Missoula Valley. This injury includes dead needles, needles falling prematurely, and general loss of plants' photosynthetic base (which makes them unable to produce food). In 1976, the average sulfur dioxide concentration in the Valley was (.032) parts per million, which exceeds both State and Federal standards.

Fluorides are very toxic to plant life and to wild animals which use that forage as primary food. Forest Service, University of Montana, and Environmental Protection Agency studies have demonstrated injury and persistent damage to vegetation on over 20,000 acres of land in Western Montana, including National Forest and National Park land.

Topography and general meteorological parameters during late summer, fall, and winter months combine to create conditions favorable to air stagnation in Western Montana; there are frequent concentrations of gaseous and particulate air pollutants. Sulfur oxides, soluble sulfates, hydrogen sulfide, methyl mercaptans, fluorides, and oxidants all have been shown to adversely affect human health, even at concentrations below National and State standards. It is believed, but not substantiated at this time, that the combined particulate - sulfur oxide - soluable sulfate complex in the Missoula Valley is a contributing factor to health problems in that area.

Table 46

TOTAL SUSPENDED PARTICULATE AT LOCATIONS IN THE WESTERN MONTANA PLANNING AREA (1975 and 1976)

ug/m^3 1/

	Montana Standard		Federal Standard		Missoula		Columbia Falls		Libby		Kalispell		Phillipsburg	
Year	24h	Ann.	24h	Ann.	24h	Ann.	24h	Ann.	24h	Ann.	24h	Ann.	24h	Ann.
1976	200	75	260	75	386	100.2	294	122.1	113	57.1	234	109.5	147	40.0
1975	200	75	260	75	240	78.2	232	76.1	196	75.1	216	105.6	113	38.1

The Environmental Protection Agency has developed criteria for preventing significant deterioration of air quality (see table 47). All of Western Montana is designated as Class II--i.e., emissions may increase, as long as they remain below the National standards. Airsheds designated Class I have more stringent standards, and Class III more lenient standards; a Class II airshed can be redesignated Class I or III only through a petition and hearing process. However, despite the Class II designation, emissions in some parts of the Planning Area already exceed National and State standards (see table III). Legally, there can be no increase in particulates in these areas. For instance, the Missoula area cannot legally increase emissions of sulfur dioxide.

Data on air quality in Western Montana is based on air samples for industrialized areas such as Columbia Falls, Kalispell, Libby, and Missoula. No air quality information for rural portions of the Planning Areas is available; however, it is generally believed that rural areas in Western Montana have much cleaner air than urban areas.

C. State and Private Forestry ~~Cooperative~~ Programs for Protection: The State and Private Forestry arm of the Forest Service is involved in several programs related to resource protection.

1. Fire Protection: The CM-2 program for cooperative forest fire management was authorized by the Clark McNary Act of 1924 (Section II). CM-2 encourages and helps State foresters in providing effective forest fire protection on State and private lands. The program's major thrust is coordination of effective fire-prevention activities. The Forest Service assists states in developing fire suppression programs, training firefighters, use of firefighting equipment, and communications. In emergencies, the Forest Service and the states cooperate to extinguish forest and range fires.

2. Forest Insect and Disease Management: The 1947 Forest Pest Control Act provides for cooperation among the Forest Service, other Federal agencies, and states to reduce tree losses from insects and disease. This is done through prevention, ~~detection, evaluation, and suppression activities on lands of all ownerships. surveys, biological evaluations, and control projects.~~ Under this program, the Forest Service shares with the State the cost of salaries for entomologists and pathologists employed by the State.

Table 47

FEDERAL AREA CLASSIFICATIONS FOR SIGNIFICANT DETERIORATION REGULATIONS

Pollutant	Class I Allowable Increase (ug/m3) 1/	Class I Allowable Increase (ppm) 2/	Class II Allowable Increase (ug/m3)	Class II Allowable Increase (ppm)	Class III Not to exceed (ug/m3)	Class III Not to exceed (ppm)
Particulates						
Annual	5	--	10	--	75	--
24-Hour Maximum	10	--	30	--	150	--
Sulfur Dioxide						
Annual	2	0.0007	15	0.0057	80	0.03
24-Hour Maximum	5	0.0015	100	0.038	365	0.14
3-Hour Maximum	25	0.0095	700	0.267	1300	0.50

1/ ug/m^3 - micrograms/cubic meter.
2/ ppm = parts per million.

X

7.92 ASSUMPTIONS FOR TOMORROW

1. Pending fire policy will provide direction for establishing new fire management objectives through the land management planning process. The objectives will be based on producing specified ranges of resource outputs, the probability of fires interfering with resource outputs, environmental considerations, and the costs and value of fire support. Until such planning is completed, direction will be provided by the current fire control objective--to suppress 90 percent of fire starts on areas 10 acres in size or smaller.

2. There will be an increase in the application of prescribed fire, using both lightning and intentional ignitions.

3. More people will live on private lands adjacent to and within National Forests, increasing the risk of fires and the potential for property loss from wildfires.

4. There will be increasing interest in smoke management, including regulation of smoke-producing activities.

5. The application of Federal-State-Private cooperative programs for protection is essential to maintaining a high-quality supply of natural resources from private lands.

6. Future development of National Forest resources in the Planning Area should take place in a way that minimizes emission of gaseous and particulate pollutants to the atmosphere.

7. In National Forest land management planning, decisions regarding air quality should be based on meteorological conditions that favor air entrapment. If air is kept reasonably clean during these periods, then during conditions favoring dispersal there will be less of a problem.

8. Any increased effort in timber harvesting and use of forest products will contribute substantially to air degradation in Western Montana. Dust from logging operations, smoke from controlled burning, and various emissions from primary and secondary manufacturing systems will cause some degree of air degradation. Each case should be thoroughly evaluated to determine potential air pollution problems. Pollution caused by a particular activity should be compared to State and National emission standards and each case studied to determine if emissions can be lowered substantially below those standards.

9. Several wildernesses and Glacier Park should be designated Class I air quality areas so that virtually no air degradation will be allowed. Protection of the air in these specially-designated areas is basic to their wilderness status and should be pursued vigorously.

10. Development of industry in rural areas with clean air could lead to atmospheric degradation and detrimental effects on health.

LANDS ELEMENT

7.10 LANDS ELEMENT

The mission of the Lands Element is to provide for those activities such as land management planning, special land use administration, land ownership adjustment, multi-resource studies, and the development of new knowledge which primarily benefits the Lands Element. These activities include technical assistance and cooperation on private lands, as well as within the National Forest System.

7.10-1 The Area Today

A. Land Adjustment and Special Uses: Western Montana has many of the same real estate management problems associated with growth that have been experienced in other parts of the United States. These include intermingled ownerships, changing land uses, and conflicting land management objectives. In addition, the growth Western Montana is experiencing comes at a time when demands for resources are increasing rapidly. Competition for land and resources is keen, and there are new laws and regulations directing land use and development.

While large portions of the National Forests are blocked into Federal ownership, the ownership pattern is fragmented in places. Checkerboard ownership patterns where lands were granted to railroads are an example. Because land management objectives for Federal and non-Federal lands often conflict, land use on intermingled or adjacent private lands can significantly affect the Forest Service's ability to meet land management objectives.

Coordinated land use planning and management between the Forest Service and private landowners has generally not been achieved. In some cases, conflicts can be resolved by changing patterns of ownership; this is accomplished through land purchase, exchange or donation. Where National Forest land is intermingled with substantial private holdings, the value of the Forest land to private landowners may render it unavailable for exchange; National Forest land often helps maintain an open-space environment that private owners usually wish to preserve.

Permitted occupancies also affect National Forest land management. Transportation corridors, large public use permits (ski areas, etc.), easements to other landowners for access, and major structures such as reservoirs and highways, all influence the way in which adjacent National Forest land can be used. Permitted occupancies may encourage a particular kind of use, thereby creating constraints on other uses. Lesser encumbrances, such as long-term special use permits, watershed permits to cities, and classification of areas for administrative purposes, have cumulative effects on management.

X

B. State and Private Cooperative Programs for Resource Management: The State and Private Forestry branch of the Forest Service participates in several programs dealing with resource management on private lands.

1. Resource Management Program: Along with the Montana Department of Natural Resources and Conservation and other agencies, the Forest Service provides technical assistance, training, and funding for resource management through the Cooperative Forest Management Program. Private forest landowners may receive technical assistance in many areas of resource management, including: silviculture, soil and water conservation, genetics and tree improvement, resource inventories and long-range planning, and forest range and wildlife management (including protection of endangered plant and animal species).

2. Agricultural Conservation Program (ACP): The purpose of this program is to share with private landowners the cost of improved conservation practices. ACP has broad objectives--to develop, protect, and conserve all renewable rural resources. While timber production may result, it is not always the objective of this program.

7.10-2 ASSUMPTIONS FOR TOMORROW

1. As demands for goods and services from private lands continue to increase, there will be a need for more technical forestry assists to carry out cooperative programs for resource management.

2. The degree of land consolidation should be determined by land management objectives identified in the land management process.

SOILS ELEMENT

7.11 SOILS ELEMENT

The primary mission of the Soils Element is to provide for activities which primarily protect, conserve, and enhance the basic soil productivity of forest and rangeland. It includes the development of new knowledge, surveys, protection, rehabilitation, and improvement activities directed toward both public and private lands through cooperative agreements.

7.11-1 The Area Today

A. Characteristics of Soils in Western Montana: Soils in the four Western Montana valleys - the Bitterroot, Clark Fork, Flathead, and Kootenai - are quite diverse. They range from mixed sands and gravels to stratified silts and clays. Soils immediately adjacent to rivers and streams generally are a loam overlying coarse gravels. Such soils are usually well-drained, flat, and quite suitable for cultivation. Farther away from rivers, the valley topography often becomes more rolling and soils contain varying amounts of rock - characteristics less suited to cultivation but favorable for grazing or tree-growing.

Most soils on side slopes draining into the Bitterroot, Clark Fork, and Lower Flathead Rivers are forming in residium (i.e., they are forming in place from parent rock). Characteristics of soils on slopes vary greatly with local geology. Generally, soils are shallow to moderately deep with medium to coarse textures and a large percentage of angular rock in their profile. Slopes are generally steep; vegetative cover is characterized by coniferous forests and minor amounts of grass.

Much of the Flathead and Kootenai Forests north of the 48° latitude line were covered by ice during the last period of continental glaciation. The ice moved from north to south and the resultant scraping and filling action left the topography with a subdued appearance. Rounded rocks and flour-sized particles reflect the scouring and scraping action of the ice. Generally, the ridges have the shallowest soils and valleys have the deepest soils. The silty particle-size of the soils and the compacted glacial till subsoils give these areas a moderate erosion potential. Glaciated soils generally have a coniferous cover.

At the same time that continental ice sheets covered the northern third of the Planning Area, alpine glaciation occurred in all the higher mountain ranges in Western Montana (Bitterroot, Mission, Swan, Whitefish, and Rocky Mountains). In many places, alpine glaciers became large enough to form valley glaciers. Except in valleys, high-mountain soils are shallow. Because alpine glaciers moved less distance than did continental glaciers, the mountain soils have a larger percentage of rock and the rocks are more angular. The valleys and their walls have a vegetative cover, while ridgetops and higher points are often bare rock, or have only alpine vegetation or a grass cover.

Much of the Planning Area is covered by a light, reddish-brown loess cap (a wind-blown deposit occurring in the upper-most soil horizon). In Western Montana, granitic soils are extensive. Such soils have a low nutrient exchange level, and where the silty or loamy loess overlies granitic soils, potential for plant growth is much greater. Silt and silt-loam soils have more favorable soil-moisture capacity and a higher level of nutrient exchange than do granitic soils. Because it is the most productive layer, the loess cap is an important consideration in National Forest management. Regardless of the management activity, it is important to maintain the productivity of these soils.

B. Erosion and Sedimentation: Erosion is the wearing away of the land surface by running water, wind, ice, or other geologic agents, including such processes as gravitational creep. Sedimentation is the deposition of eroded materials. The erodibility of soils varies, depending on their ability to overcome the active forces to which they are subjected. Although the amount of highly erodible soils in Western Montana is limited, it is these soils which cause land managers the greatest concern. Soils on very steep granitic mountains and in continentally glaciated areas are among those with the highest erosion rates.

Human activities that severely disturb the soil greatly accelerate erosion and sedimentation. In National Forests, activities associated with timber harvest, such as road-building and use of skid trails, cause the most erosion and sedimentation. Besides affecting the soil resource through nutrient loss, erosion and sedimentation also impact other resources. Erosion can decrease production of biomass; sedimentation entering streams can lower water quality.

Because it is possible to predict soil's response to human activities, steps can be taken to prevent severe erosion. For instance, timber harvest may not be allowed in areas with high potential for soil erosion. On other highly-erodible soils damage to resources can be controlled by using other than conventional methods of harvesting timber.

C. Land Systems Inventory: Soil scientists in the Forest Service Northern Region have been classifying and mapping National Forest lands since 1970 using a system of land classification designed specifically to provide the kinds of soil and watershed information needed for land management planning for the Region's National Forests.

A land systems inventory was designed to meet specific land management planning objectives which relate to all resource systems and to meet several specific Forest Service land inventory objectives:

1. Provide a system of different levels of inventory whereby large tracts of land can be rapidly inventoried for broad overview purposes or in setting up detailed inventories that will meet the needs of land managers.

2. Permit the best possible inventories, considering limited manpower and money.

3. Collect reliable data that can be used as a basis for land management decisions.

4. Present data in a manner that users can relate to and understand.

5. Interpret data needed for designs regarding various land management activities.

The land systems inventory is a hierarchical system of land classification which integrates geology, climatic history, soils, and plant ecology to achieve better understanding of land characteristics. Each mapping level of the system integrates these elements at a level of generalization corresponding to the level of information needed for specific planning problems. The units identified for each mapping level can be subdivided into more homogeneous units at more intensive mapping levels or combined to form more heterogeneous units at less intensive mapping levels.

The inventory level used in conjunction with this Planning Area Guide is equivalent to the subsection level of the land systems inventory. At the subsection level, mapping units are delineated on the basis of the earth's structure, lithology, and climate. At this level, the size of individual mapping units may range from 10's to 100's of square miles. Land inventory at the subsection level has application for broad area planning (see table 48).

Table 49 is a key to Forest Service Northern Region subsections. It indicates that land areas were classified according to province, then further classified according to section and subsection. For example, glacial deposition basins are one subsection of the subalpine fir, Douglas-fir, Cedar, Hemlock Section. More specific planning necessitates delineation of smaller mapping units and consideration of the interrelationships among factors such as landform, soils, and vegetation.

LAND SYSTEMS INVENTORY

Category	Name	Basis for Delineation	Size Range	Principal Application
VII	Physiographic Province	Basic Elements Structure, lithology, climate. First order stratification.	1000's of sq. miles	Nationwide or broad regional data summary.
VI	Section	Basic Elements Structure, lithology, climate. Second order stratification.	100's to 1000's of sq. miles	Broad regional summary. Basic geologic, climatic, vegetative data for design of individual resource inventories.
V	Subsection	Basic Elements Structure, lithology, climate. Third order stratification.	10's to 100's of sq. miles	Strategic management direction, broad area planning.
IV	Landtype Association	Manifest Elements Soils, landform, biosphere. First order stratification.	1 to 10's of sq. miles	Summary of resource information and resource allocation.
III	Landtype	Manifest Elements Soils, landform, biosphere. Second order stratification.	1/10 to 1 sq. miles	Comprehensive planning, resource plans, development standards, local zoning.
II	Landtype Phase	Manifest Elements Soils, landform, biosphere. Third order stratification.	1/100 to 1/10 sq. miles	Project development plans.
I	Site	Represents integration of all environmental elements. Units are generally not delineated on map.	Acres or less	Provides precise understanding of ecosystems. Sampling will be for defining broader units, for research, and for detailed onsite project action programs.

Figure Y

Key to Northern Region Subsections

	Mapping Unit (subsection) Symbol
I. Columbia Forest Highland Province (Pacific Maritime Climate)	
A. Subalpine fir--Doughas-fir--Cedar--Hemlock Section)	
1. Glacial deposition basins	B_4
2. Glacial deposition mountains	M_4
3. Noncarbonate Belt rock mountains	$M_$
4. Carbonate Belt rock mountains	M_{14}
5. Belt rock mountain fault escarpments	M_{15}
6. Belt rock dip slopes	M_{16}
7. Old weathered rolling uplands	M_{17}
8. Gneiss and schist fault escarpments	M_{19}
9. Steep mountain lands in gneiss, schist, and granites	M_{22}
*10. Lava flow plateaus	M_{23}
*11. River breaklands	M_{24}
B. Hemlock-Douglas-fir Section	
1. Glacial deposition basins	B_6
C. Ponderosa pine--Douglas-fir Section	
1. Carbonate Belt rock mountains	M_7
2. River breaklands	M_{12}
*3. Lava flow plateaus	M_{21}
4. Noncarbonate Belt rock mountains	M_{25}
D. Azonal: Topo-Epaphic Climax	
D1 Cottonwood--Shrub--Bunchgrass Section	
1. Floodplains	A_2
D2 Alpine turf--Subalpine Fir--Spruce Section	
1. Alpine and subalpine ridges, peaks, and glacial cirques	M_{10}
D3 Idaho fescue--Bluebunch Wheatgrass Section	
1. Mountain grasslands	M_4
II. Rocky Mountain Forested Highland Province (Continental Climate)	
A. Supalpine fir--Douglas-fir Section	
*1. Glacial deposition basins	B_5
*2. Metamorphic rock mountains	M_3
3. Soft sedimentary rock mountains	M_6
*4. Granitic mountains	M_8
5. Very steep volcanic rock mountains	M_{18}
*6. Rolling volcanic rock mountains	M_{20}
B. Douglas-fir--Ponderosa Pine Section	
*1. All rocks except limestone and granite mountains	M_1
*2. Limestone mountains	M_2
C. Azonal: Topo-Edaphic Climax	
C1 Alpine turf--Subalpine Fir--Spruce Section	
1. Overthrush mountains	M_5
*2. Alpine ridges, peaks, and glacial cirques	M_{10}
C2 Idaho fescue--Bluebunch Wheatgrass Section	
*1. Mountain grasslands	M_4
C3 Cottonwood--Shrub--Bunchgrass Climax	
*1. Floodplains	A_2
III. Semi-Arid Steppe Lowlands Province	
A. Western Wheatgrass--Needles & Thread Blue Gamma--Big Sage Section	
*1. Alluvial basins	B_1
*2. Folded sedimentary rock foothills	F_2
*3. Gravel-capped bench foothills	F_3
*4. Sedimentary benchland plains	P_1 & P_5
*5. Rolling shale plains	P_2 & P_6
*6. Badlands	P_3
*7. Glacial deposition plains	P_4
*8. Moderately dissected sedimentary bench plains	P_7 & P_8
*9 Rolling sandstone plains	P_{11}
B. Rough Fescue--Idaho Fescue--Bluebunch Wheatgrass Section	
*1 Alluvial basins	B_2
2. Glacial deposition basins	B_3
*3 Igneous and metamorphic rock foothills	F_1
4. Gravel-capped bench foothills	F_4
*5. Hogback ridge foothills	F_5
*6. Limestone plateaus	F_6
*7. Folded sedimentary rock foothills	F_7
*8. Palouse prairie loess hills	P_{13}
C. Azonal: Topo-Edaphic Climax	
C1 Ponderosa Pine--Bunchgrass Section	
*1. Highly dissected sedimentary benchland	P_{12}
C2 Cottonwood--Shrub--Bunchgrass	
*1 Floodplains	A_2
IV Sub-Humid Prairie Lowland Province	
A Bluestem--Prairie Sandreed Section	
. Choppy sandhills	P_9
*2. Sandly glacial lake plain	P_{10}

*Indicates mapping units which, according to the inventory, are not found in the Western Montana Planning Area.

7.11-2 ASSUMPTIONS FOR TOMORROW

1. Soil characteristics will make it necessary to limit activities such as timber harvest, recreation, and fire control in some areas.

FACILITIES ELEMENT

7.12 FACILITIES ELEMENT

The mission of the Facilities Element is to ~~provide for~~ carry out activities which provide and maintain capital improvements (such as buildings, roads, fences, bridges, dams, and airfields) benefiting all resource systems. It includes the development of new knowledge and its application through cooperative and technical assistance efforts.

7.12-1 The Area Today

A. Roads: There are approximately 13,200 miles of roads in the Area's National Forest Transportation System. About 55 percent of these roads need some type of reconstruction, particularly drainage or surface improvements. Inadequate cut- and fill-slope activities have led to problems with slope instability. Where road grades are excessive, ditch and surface erosion has been accelerated. Sheet erosion has resulted from limited revegetation of slopes following construction. In addition, slash debris left along many miles of roads detracts from the beauty of landscapes.

Aside from seasonal removal of blowdown and snow, road maintenance in the National Forests is normally limited to timber sale areas. Engineering efforts are most often concentrated on road location and design. Signing (both regulatory and informative) has generally not kept pace with road construction.

B. Trails: In Western Montana, most National Forest trails were developed during the late 1920's and 1930's, primarily for administrative access. Since World War II, many of the Area's trails have been replaced with roads, except in areas where roadless management is specified.

Presently there are about 6,440 miles of trails in Western Montana National Forests. The portion of Glacier National Park which is in the Planning Area contains 470 miles of trails, and about 140 miles of the Continental Divide Trail (a component of the National Trails System) is within the Planning Area. About 30 percent of National Forest trails and 10 percent of trails in Glacier Park are considered inadequate for the use they receive. Trail maintenance, on the whole, has been minimal and the quality of many National Forest trails has gradually deteriorated.

C. Airstrips: Seven landing strips are within National Forests in the Planning Area. Most of these airstrips were constructed to minimum standards and have been maintained for limited administrative use. Use by the Forest Service has not increased significantly through the years; however, use by other parties has increased considerably.

D. Other: Use of railroads to transport logs from National Forest to mills is not as prevalent as in the past, because other forms of log transport became less expensive. Many sidings once used to load logs in the past have been removed due to lack of use. Several ski areas are situated in Western Montana National Forests (allowed by Special Use permit), and roads providing access to these facilities often cross National Forest land.

7.12-2 ASSUMPTIONS FOR TOMORROW

1. Use of the National Forest road and trail transportation system for all purposes will continue to increase.

2. As use of roads increases, more intensive road and traffic management in the National Forests will be necessary.

3. For the most part, width and alignment standards for roads will be satisfactory for anticipated use.

4. As fuel costs increase, rail transport of logs may become a more viable means of transportation.